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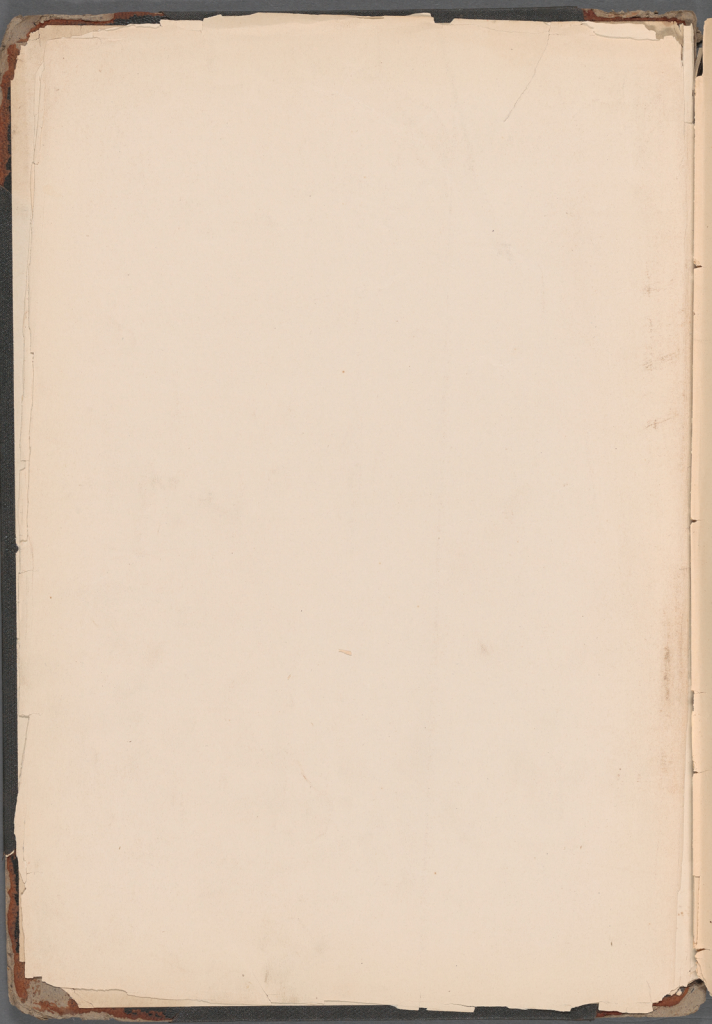
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AND
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VOL. VI.—No. 1.

NEW YORK, FEBRUARY, 1875.

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lections from Saunder's Traite d'Horlogerie.

Translated for The Jewelers' Circular.

BY A. SIDES.

MAKING A CYLINDER.

Before giving any details on the construction of this escapement, we will make a few observations on a certain class of watch makers. To make or repair a watch properly is an operation which calls for more care and attention than is usually given it. It is very essential for us to remember that to make watches to run only, by cutting right and left at them, is the work of botches; but to repair them well requires a theoretical and practical knowledge of the trade.

To understand the state of a watch without groping, and to know what is to be done, is to make it run properly, and to do so with a certainty of success, is not to be expected from a natural born watchmaker, but only from the well trained workman. This should be an advice to those who often, after a whole life of practice in watch repairing, are yet unable to repair watches properly, and even cannot tell why they do not perform well. This much said, we will proceed to show how to make a cylinder, not, however, before giving a few reasons why we have sometimes to make our own cylinders. Watch material dealers are generally on hand with large assortments of cylinders, but very often they are so badly made, being too soft, badly cut, and untrue, that in some cases we are obliged to make the cylinder we want. Sometimes also we have cylinders of extraordinary sizes which cannot be found anywhere, and which we are obliged to make. This operation requires some care and dexterity, but is far less difficult than the execution of the wheel which necessitates special tools for its manufacture.

The following is the direction to find the measure for the proper height of a cylinder when we have not the old one: We take a small strip of brass about a millimeter wide, 2 or 3 centimeters long, and the thickness of a playing card; we put some rouge on the end of the teeth of the wheel and on the sides of the wheel the wheel being in place, we hold the strip of brass upright, resting on the potence jewel as if it was the cylinder itself; we move the wheel forward and backward and then cut the brass rule the same shape as a cylinder where the rouge marks it, trying it at different times to see if the arms of the U are in the centre of the small cut. (Fig. 22.)

Having removed the endstones, we put the balance in its place and measure with the calipers, or some other measuring measure, the distance from the outside of the two jewels which is the extreme length of the cylinder, and having removed the potence from the plate, we now put the balance bridge in its place and measure again to see if the distance is the same as before, if not, something is wrong, and we make the necessary alteration. Then with some measure for this purpose, we take the distance between the inside of the jewels, with this measure, from the lower end of the brass rule, we draw the line B, and then the two lines C and O, to show the length of the two shoulders without any interference to the solidity of the lower cannon, nor to the space necessary for the brass shoulder used as a seat for the balance. The brass rule thus prepared, it will be easy to make the cylinder of the right proportions, since we will know: 1st, The heights of the small and large cuts; 2d, The length of each cannon, O and S; 3d, The total length of the cylindrical shell from O to C; 4th, The length of each shoulder, D O and C B. Fig. 22. It will be sufficient hereafter to add the thickness of the two jewels to have the whole length of the cylinder.

Now take a piece of the best drawn steel about 5 centimeters long, one third larger than the cylinder requires to be. Having straightened it, we draw the color

to a very light blue and let it cool slowly to soften in, make a sharp center on one end, and a point in the centre of the other end. Then screw on it a medium size collet and use the bench lathe and a work bow to drill a hole a little smaller than the length of one tooth of the scape wheel, being careful to put plenty of oil during the operation. When the hole is drilled deep enough, we turn the cylinder to nearly the size, and a little longer than is wanted. Then take a thick brass collet and screw it, but not very tight on the cylinder thus prepared, to hold it while the hole is being opened. We must never use any players during this operation for fear of flattening the cylinder. Now take a broach, very little tapering, well hardened and finished and having equal angles, and then open the hole in the cylinder from one end and open from the other alternatively until one tooth of the wheel goes in without shock. If the teeth of the wheel are too short, we must open the hole larger in order to have the shell of the cylinder as thin as possible. We now take a piece of steel wire large enough to go free inside the cylinder, and hold it by the two ends in a saw frame, being careful to spring the saw frame as much as possible to prevent the steel wire from bending, and using fine stone dust and oil, we smooth the inside of the cylinder by rolling it over the finger, going from one end of the wire to the other at the same time. When the tooth of the scape wheel goes in free, we take an abnor turned very true, with the least possible tapering, and put the cylinder on it but not too tight; then with a hair bow and a well sharpened gear, we turn the cylinder cylindrical the whole of its length until it resists without shake between the point of one tooth of the wheel and the next one, smoothing it then with oil stone dust and a flat piece of iron. Before cutting the cylinder we must be sure that the shell is not too thick, for, if it is, the case cannot be made larger, it must be thrown aside and a new one made. Now turn a piece of brass cylindrical long enough for the purpose, and put the cylinder over it, just tight enough so that it will not move while being cut, always keeping the lathe in motion. Some use the depthing tool and a circular cutter the same width as the cut to be made, and others use simply a square file, holding the cylinder on the lathe and turning it. We make the large cut first, and the height of it must not be over one and a half the thickness of the wheel. To make this cut of the right proportion, the Jacob cylinder gauge can be used. The cylinder when cut, must go in the narrow side of the gauge opposite to where the whole cylinder goes in the large side of it, leaving one or two degrees for forming the lips, and polishing. The small cut must leave one quarter of the shell, and the flat of the cannon must be at right angles with the cuts, and fillets very flat, which require a great deal of care. To give to the lips their proper shape, put the cylinder on a piece of turned brass wire which will go about two-thirds down the length of the cylinder, being careful not to file too much, or else the cylinder will be too much opened; the greatest care must be taken while filing the small lip, and while filing towards the small cut, which would make the cylinder worthless; we must also be very careful not to bend the cylinder while filing or resetting it from the wire. Then remove the burrs from the inside with a wire and stone dust, and smooth the lips until no more marks can be seen on them. Soft steel, or brass, can be used for this purpose, but ruby files are better when they can be got. Great care must be taken not to alter the form of the lips while smoothing them. The cylinder is now ready to be hardened, which can be done in many different ways, but we will only speak of the two following: 1st, Bend a piece of wire, and hang the cylinder on it, hold it over a small flame of a lamp in some dark corner so as to see the color better, and drop in oil as soon as it is cherry red, but never go beyond that color; 2d, Put the cylinder in a small brass tube, heat the whole cherry red, and drop in oil. We prefer this last method as being less dangerous to bend the cylinder in hardening it. The cylinder being well hardened is very brittle and must be handled with great

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in December Number, 2, in his *Traite d'Horlogerie*, 1667, p. 188, No. 58, states, in made his dead escape with the rest at equal distance of action of the pallets, Fig. 21, and has so on in Plate xlii., Fig. 9, of

I apprehend a very general and correct rule, and one easy of application, for determining the distance at which the centre of action of the pallets ought to be placed from the centre of the scape wheel, and for drawing the lines of the dead escapement, may be given.

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rk.

Having determined the diameter of the wheel, the number of its teeth, and the number of the teeth of the wheel the pallets are to take over, draw a circle circumscribing the points of the teeth of the wheel, and upon this circle at the proper places as determined by the opening of the wheel, mark the thickness of the pallets, which, making no allowance for drops, should always be half the space between two points of the teeth for each pallet; that done, draw two straight lines between the points that mark the thickness of the pallets upon the circumscribing circle; these lines will be chords to the portions of the circle they subtend; prolong these two lines until they intersect each other; the point where they meet will be the proper centre of motion for the pallets. Next, to describe the circular faces of the pallets, from the centre of motion as above determined, draw portions of two circles that shall intersect the circle circumscribing the wheel at the four points which mark the place and thickness of the pallets. The angle of lead, which is quite optional, must then be determined—this is done by drawing two lines from the centre of action of the pallets; the one within and the other without the lines by which the said centre was found, and forming with those lines two equal angles; the angle of lead determined, it now only remains to draw the inclined planes or acting faces of the pallets; this is done by drawing two diagonal lines from the upper to the lower points of intersection of the lines forming the sides of the two angles of lead, by the circular faces of the pallets.

FIG. 23.



To illustrate this further, suppose A B C, Fig. 23, a supposed circle of teeth, to which it is required to apply a pair of dead-beat pallets, which are to take over two teeth, or what is the same thing, occupy the portion of the circle contained between three teeth*; circumscribe the points of the teeth of the wheel by a supposed circle, E F Z, divide each of the spaces, D E and E F, between the teeth, D E and F, into two equal parts at G and H, draw the straight lines, D G and F H, and prolong them until they meet at I; the point, I, will be the proper centre of motion for the pallets, from the centre, I, draw the two portions of circles, K L and M N, intersecting the circumscribing circle at the points, D G and H F, the circular rests of the pallets will be a portion of these circles; the inner rest of the smaller, the outer rest of the larger circle. To determine the angle of lead of the pallets, prolong the two lines, I H F and I G D to O and P, and from the point, I, draw the two straight lines, I Q and I R, forming the two angles, O I Q and R I P, equal to one another, and from the points, F and S, of intersection of the sides of the angles by the portions of circles, K L and M N, in the one angle, and the points, D and T, in the other, draw the straight lines, F S and D T, these will be the inclined planes or faces of the pallets.

As this mode of proceeding would be very difficult, not to say impossible, in practice, except in the case of large wheels, on account of the little distances, the points that determine the thickness of each pallet are from each other; the preferable mode is, after having determined the place of the pallets upon the circumference of the wheel, as above described, to draw from the centre, X, of the wheel, Fig. 23, the two lines, X U and X V, bisecting the arcs, P H and D G, which mark the thickness of the pallets; and from the points, V and V, where those lines intersect the circle, to raise the two perpendiculars, V W and V W, which lines will be tangents to the circle; and that done to draw the lines

F H I and D G I, parallel to the two lines V W and V W, and the point, I, where they meet, will be the centre of motion of the pallets, and must be the same originally formed; for a chord will always be parallel to a tangent touching the same circle, when the tangent touches the circle at a point equidistant between the two points where the chord meets the circle; and that is the case here, for, by the construction of the figure, the angle, X V W, is a right angle, and the angles, V X P and V X H, equal angles. The chord, H F, being parallel to the tangent, V W, it follows that the line, O I, which is the chord, H F, prolonged, must be parallel to the same tangent, V W. A similar demonstration will apply to the chord, D G.

That there is but one proper place for the centre of motion of the pallets, and that it is the point found as above described, will be evident, when it is considered, that, for the pendulum to be led an equal quantity by the action of the wheel on each pallet (the inclined planes of which must be of equal length, otherwise the action will not be the same on both), it is requisite, making no allowance for drop, that, at the instant the wheel has advanced a quantity equal to half the space between two of its teeth, the lead of the pallet should be completed, and that the tooth which has just led the pallet to the extremity of the angle of lead of the pallet, should quit the pallet; and, at the same instant, the other pallet should present itself in such a situation, that another tooth of the wheel may come into action with it; that when that tooth shall have advanced the same quantity as the preceding, that it shall also have led the other pallet which it has acted upon to the extremity of its action of lead; and have brought the first-mentioned pallet into a situation to receive the following tooth of the wheel to that by which it was previously led.

This can only be the case when the lines, I O and I P, which pass through the circumscribing circle, intersect it at the points which determine the thickness of the pallets, which, from the construction, it is evident in this case to be. By reference to the figure it will be seen, that in consequence of the angles, O I Q and P I R, being equal to one another, and the sides, O I and I P, of the same angles intersecting the circumference of the circle at the points, H F and G D (equidistant each to each from the point, I), where the circles forming the circular rests intersect the circle circumscribing the points of the teeth of the wheel, the pendulum is led a quantity equal to each of those angles at each vibration. For, supposing the wheel advancing, at the instant the point, F, of the wheel, has reached the extremity of the inclined plane of the pallet, A, the point, S, of the pallet will have reached the point, H, and the point, T, of the pallet, B, will have reached the point, G, ready to receive the tooth, I, which, at that instant will drop upon it; and when, by the action of the tooth, I, upon the pallet, B, it is returned to its former place, the point, F, of the pallet, A, will be ready to receive the tooth, S, which will at that instant drop upon it.

To render the above demonstration as apparent as possible, the wheel has been drawn with only six teeth, because, supposing a wheel, even of the size of the wheel in the figure, with thirty teeth, (the number for a second pendulum,) in which case the pallet would be only one-fifth of their present thickness, the portion of the circle the chord would subtend would be so short, and consequently, the space between the chord prolonged, and the tangent so small, that the distance between the points, I and W, would be much less apparent. In the case of a scape wheel of the size usually employed in second pendulum clocks, in laying down the lines for

* It may be worth while to notice, as a general rule, that a pair of pallets always occupy the space or portion of a circle contained between the number of the teeth they take over and one more, thus, taking over two teeth, they require the space contained between three teeth: were they to take over ten teeth they would occupy the space contained between eleven. The reason is evident: it is the sum of the thickness of the pallets, without the teeth, and the other within, and the thickness of each pallet being equal to half a space, the thickness of the two together must be equal to one entire space; no allowance, as before observed, being made for drops.

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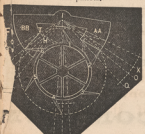
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urpose of determining the distance en the two centres, it will be sufficient when very great accuracy is ed, to draw two lines, bisecting the which mark the thickness of the is upon the circle of the wheel, and lines, at the points where they ersect the circle of the wheel, to raise to perpendiculars, and to take the setwise perpendiculars meet, at the otion of the pallets.



ere the centre of motion of the pallet ed higher or lower than the proper e, as above determined. See Figs. 24 25, in both which the angle of lead is the same as in Fig. 23. In the ection of the tooth of the wheel the inclined plane of the pallet, A, Fig. 24, (here the centre of motion of allets is raised), would lead the pallet an angle less than the angle of I Q, as drawn, by a quantity equal angle, O I X, and consequently, the T, of the line, T D, or inclined plane pallet, B, B, instead of having ad a sufficient quantity to meet the I, at the point, G, will only have d to H, and the point of the tooth d drop upon the inclined plane, H e pallet between H and P, and the dvancing with less rapidity than el they will meet nearer P than

other case (the centre of motion allets is dropped nearer to the centre wheel) the action of the wheel



lined plane of the pallet, A, d lead the pendulum, an angle the angle O I Q of lead al by a quantity equal to the e, and consequently the pallet ed so much too deep into the point of the tooth, I, ing safely upon the pallet, in its circular rest at a very distance from the point H.

eat would result in practice from ing on the inclined plane of the e to cause the scape wheel, and e whole train of wheels to recoil, ne of the principle of the escape- e reduced by the tooth taking more al rest than is absolutely neces- e is to considerably increase the ead. In practice the tooth should theiler rest, and so more.

Uses of Clocks and Watches.

ma-
ward J. Wood,
ten
to of watch, the case of which is parated with foliated scroll-
fold-perforated and enameled.
ne is "Claude Pascal," a
T diameter is two inches,
was purchased at the Bernal
tion and also a good enameled
neck of the case of which
life. An Elector and Electress
in classical costume. In
he dial are Diana and

Endymion; and round the sides are land-
scapes in medallions. The maker's names
are "Les deux Frères Herat de Son, P. F.
& Berlin." The diameter is one inch and
five-eighths. This watch was purchased
at the Bernal sale for 146. 10s. Mr. R. J.
Barraud has an enameled watch of the
seventeenth century, of French manufac-
ture. Miss P. A. Cameron has a gold
watch, enameled with a classical medallion.
It is attached to a chain of similar char-
acter, with two seals and a key.

A correspondent of the "Gentleman's
Magazine," for 1810, states that an enameled
watch of early date had then lately
come into his possession; it was the
companion of the one which Mrs. Joyce
Frankland holds in her hand in the en-
graving in Chirton's "Life of Dean
Nowell," from the picture of that lady in
the hall of Brasenose College, Oxford,
made about the middle of the sixteenth
century. The watch in form resembled
that which we now term a hunting-watch;
but it was more than double the size of
any watch at present in use. The outer
case was not of gold, but of a metal which
much resembled fine pale brass, or some
mixed metal. The inner case was covered
with figures exquisitely wrought in the
mass of the enamel. The maker's name
was "Jehan (Jehan) Augier Paris."

A writer to "Notes and Queries" says,
"I have recently examined an ancient
watch, which is said to have belonged to
a navigator eminent in English history.
The name of the maker of the watch in-
scribed on it is 'Jehan Augier & Paris.'
The reader will gather from the above
that early watches were often very beauti-
ful with their decorations of enamel.
Many too were also most elaborately
engraved and otherwise ornamented. Thus
we find in the South Kensington Museum
a watch set in a medallion of mother-of-
pearl, decorated with cameo portraits and
trophies in gilt metal. The whole is en-
riched with precious stones. The diameter
of the watch is one inch, and of the
case three inches and three-quarters.
It was purchased for 35l. Also a silver
watch, the sides and back of which are
engraved with flowers and scrolls. The
dial is engraved with the hours, and the
days of the month; the maker's name is
J. Bock; and the diameter is two inches.
This watch was purchased at the Bernal
sale for 9l. 10s. Also a silver watch, the
back and sides of which are engraved with
figures of the seasons and with flowers.
The maker's name is Jean Rousseau; and
the height of the article is two inches and
a quarter, and the width one inch and
seven-eighths. It was purchased at the
Bernal sale for 3l. 5s. Also three fol-
lowing watches, all of which were origi-
nally in the Bernal collection:—An oval
silver watch, richly chased with arabes-
ques and scrollwork. The dial-plate is of
gilt metal engraved; the length is two
inches and three-eighths, and the width
one inch and a half; and the maker's
name is "C. Carneel & Strasbourg;" and
the height is two inches, and the width
one inch and an eighth. It was bought
for ten guineas. A silver watch, the back
of the case of which is embossed to
resemble a rose. The maker's name is
Benjamin Rotherhold; and the length is
one inch and five-eighths, and the width
one inch and a quarter. This article is of
the seventeenth century, and it was pur-
chased for 7l. 15s. In the same museum
is a watch in a crystal case in the form of
a fleur-de-lis, by "G. Senex, horloger du
Roi, & Rouen," 1660. The size of this
article is two inches and a half by one inch
and a half; and it was purchased for 12l.
And also another watch in a crystal case,
oval in shape, and facet cut. It is in size
two inches by one inch; its date is the
seventeenth century; and it was purchased
for 8l. Mr. J. Heywood Hawkins has a
small oval silver watch, engraved with
flowers on the outer case. The maker was
"Jo. Minall in Fleet St." Another ex-
isting watch of gold has an embossed
allegorical representation of the four seasons
at the back, and is inscribed, "Joseph
Martineau, senior, London, No. 1142."

Watch-keys also were developed into
very decorative articles, and some which
have been preserved exhibit considerable
taste in their design and construction. In
the South Kensington Museum is one

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a gilded bronze, representing a siren. It is of Italian cinquecento work; the length is one inch and five-eighths; it was formerly in the Soulaiges collection; and it was bought for £1.

The durability of watches when well-made is very remarkable. One was produced in going order before a committee of the House of Commons to inquire into the watch trade, which was made in the year 1660; and, notwithstanding the date which can be kept going are now in the possession of the Clockmakers' Company.

In the "Kingdom's Intelligencer" of February 4th-11th, 1661, is advertised as lost—"a round high watch, of a reasonable size, showing the day of the month, age of the moon, and tides; upon the upper plate, Thomas Alcock feild."

Lady Fellows has an oval silver-gilt plain watch, with pounced letters O. C., and a sword in front. On the back are the words "For God and the Commonwealth," and on the dial-plate "A Hooke, 1661."

The initial and the motto seem to point to the time of Cromwell; but the date is subsequent to his rule, and in the reign of Charles II.

The following case, abridged from Lord Stair's "Collection of Decisions of the Court of Session," relates to a strange occurrence which took place in the Parliament of Scotland in 1662—"The Lord Cosper alleging that, being sitting in Parliament, and taking out of his watch to see what hour it was, he gave it to my Lord Pittislog in his hand, and that he refused to restore it; therefore craves to be restored, and that he may have the value of it *propter affectum*, by his own oath. The defender alleged, and offers to prove, that the pursuer having put his watch in his hand, as he conceives, to see what hour it was, according to the ordinary civility, they being both sitting in Parliament, the Lord Sinclair putting forth his hand for a sight of the watch, the defender laid in the pursuer's presence put it in his hand without the pursuer's defence, which must necessarily import his consent and liberate the defender. The pursuer answered that the defender having put forth his hand, signifying to call for the watch, the pursuer put the same in his hand—meaning that which is ordinary, to the defender, the watch to see what hour it was—which importeth the defender's obligation to restore the same. The defender's giving of the watch to Lord Sinclair was so said an act, that the pursuer could not prohibit, specially they being sitting in Parliament in the time; and, therefore, his silence cannot import a consent. The Lords (4, 6, 8, 9, 10) repelled the defence; but would not suffer the price of the watch to be proven by the pursuer's oath, but *propter de jure*."

To be continued.

Engraved Gems.

HISTORY OF THE GLYPHIC ART.

By C. W. KING.

The prophet Enoch has recorded that it was Azael, the chief of the angels who took unto themselves wives from the daughters of men, who taught "the secret stones of every valuable and select kind," and, although the "seventh from Adam" is no longer regarded as a canonical authority, yet history and archaeology combine to point out the first crucible of the human race as the region where originated the notion of applying stones, recommended by their beauty of appearance, to the purposes of personal decoration, and of serving for signets. It is a remarkable fact that, whilst the old Greek mythologists have ascribed to some particular divinity, or hero of their race, the authorship of almost every other useful, or ornamental art, and of the instruments employed therein (as of ship-building and of the loom to Pallas, of the saw and the auger to Dedalos, of the working in metal with the hammer and anvil to Cymrus the Cyprian, of the lathe to Theodorus of Samos, &c.), they should have left unnoticed the inventor of the several processes employed by the glyptic art. And this neglect is the more surprising, from the art being according to their habits of thought, of such extreme importance, and that infinitely more on account of its subservience, during the greater part of its flourishing existence, to the uses of public and private

life, than to the mere gratification of taste and the love of the beautiful. This silence on the part of Greek mythographers, ever ready to claim for their own countrymen the credit of every discovery in science or invention in manufacture (even when manifestly due to foreigners and merely naturalized and perfected upon Hellenic soil), sufficiently declares both the unlikely exact origin of the art of engraving upon gems, and also its comparatively recent introduction into Greece and Italy. The negative testimony, too, of Homer upon this point is justly considered by Pley in proof of the same thing. He observes that no mention whatever of signet rings is to be discovered amongst that poet's minutest descriptions of ornamental jewels, although he particularly specifies earrings, necklaces, and hair-curls, the work of the Olympic court-jeweller, Vulcan. In fact, it is apparent that gems even in their native state, were totally unknown to Homer; amber (and possibly pearls, in the solitary instance of Juno's "triple-eyed" earrings, adorned with pearls, besides gold, that enter into the composition of his jewelry; and yet he describes it with great exactness, and with an evident appreciation of the artistic skill displayed in its workmanship; for example, when he vividly pictures to us the brooch of Ulysses chased with the group of a hound pulling down a "sorely panting stag," and that of the Phrygian king to have the two, though formed in gold, seemed, that one barking as he throttled the deer, the other, struggling to get loose, kept bawling for assistance. But it is the truth that the real precious stones were till long after but little known to the Greeks, before, first, Asia was opened up to them by their intercourse, but hostile and unskillful with the Persians, and subsequently by the conquests of Alexander.

Again, a still more convincing proof that signets were not in use with the Greeks in the Hellenic age, is that whenever the poet has occasion to speak of the securing of treasures, that end is always effected by means of an artfully tied knot, and not by the use of a seal, which is only understood by its maker; not by the imposition of a seal in after times, the regular substitute for a lock amongst both Greeks and Romans. Furthermore, the Greek letter carrier by Belierophon to Jobates has no seal upon it that is mentioned, it is simply called "a folded tablet;" and, again, when the heroes cast lots, before the duel with Hector, it is done with marked sticks, and not with signet rings of gold, which became the established method after the latter ornaments had come into general use. Later poets, indeed, transfer to the heroic ages the customs of their own times; the dread of an anachronism being a feeling of purely modern growth. Sophocles, for example, makes Electra recognize her brother, Hercules, upon his producing the signet, of his father, Agamemnon:

"Art thou then he? Oast but thine eye on this, My father's seal, and learn I speak truth."

And similarly the Theans of Euripides exclaims, on beholding Phaedra's accosting letter, discovered by him upon her corpse:

"And lo! the impress of the gold-wrought signet of her, that is mine into mine eyes."

But the Athenian poets, as just remarked, never troubled themselves about archaeological accuracy. In fact, Lessing, in his dissertation upon the famous "Ring of Polykrates," boldly maintains that the Greeks did not begin to wear signet-rings at all before the date of the Peloponnesian war. In this he is probably correct, if his opinion be restricted, in our sense of the word, to the actual ring, containing the engraved gem. For had it been a regular fashion with his countrymen, at the time when Herodotus flourished, to wear the engraved stone set in a ring upon a finger that observant travelers would have noticed as a striking peculiarity in the Babylonian customs (and as he was of putting down such habits in a ring upon a finger (manners) their mode of wearing the signet, "which every man possessed" by means of a string suspended from the wrist or neck. His silence on this point proves that he passed the fashion over unnoticed, as a matter of course, and familiar to him at home.

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The Goldsmiths' Art.

FROM THE EARLIEST TIMES

Continued.

This brotherhood of monks, "skilled in all the arts," retained their excellence for many generations, and were brought into play by Charlemagne, whose will shows he possessed great riches in gold-work. A number of the most superb specimens followed him into the tomb; his embalmed body, wrapped in imperial robes, having been placed on a throne of gold; his sword, with embroidered scabbard and gemmed pommel, placed at his side; his head encased by a chain of gold, and before him his golden shield and sceptre hung against the wall.

In this royal state, the corpse sat in its sepulchral chamber under the dome of the church of *Aix la Chapelle*. But even in the tomb of the greatest king of those centuries was not a sanctuary wherein gold and silver were safe; it was rifled, possibly by Frederick Barbarossa, who caused Charlemagne to be canonized, and nothing of that great man is now extant, except the crown and sword, still forming part of the regalia in Vienna. Laharte, in mentioning the destruction of other notable works in gold of early French art, vindicates the Reformation and the Revolution from the imputation so often cast upon them, particularly on the former, of causing the destruction of monuments of art; showing that such desecration was also wantonly and feloniously resorted to by kings and priests when no principle was at stake. Thus the shrine of St. Germain des Pres, fabricated in 888, was consigned to the crucible by Abbot Williams in 1406; as that of St. Genevieve, designed by St. Eloy himself, had been during the reign of St. Louis; and as the great silver grating of admirable workmanship, the delight of the votaries of St. Martin was afterwards by Francis I. Yet gold and silver have been the best treasures of early works of the description we are considering, shrines and altars are not wanting, as well as chalices and the plates illustrating of the Byzantine and Gothic taste in the early and middle ages. One of these, now preserved in the Hotel de Clugny in Paris, one of the most delightful museums in the world to the student of art, has been much quoted. It is the golden front of the altar of the cathedral of Basel, of the time of the Emperor Henry II, 1009. Not melted, but cast at auction, it has survived, and been added to that great collection. It is nearly six feet in width, and represents Christ in the centre, with the archangels, Michael and Gabriel, on one hand, and Raphael and St. Benedict on the other. They stand under the arches of a Romanesque arcade, supported by columns, the shafts of which are divided midway by round fillets, their capitals being of the form called, sculptors, cushion-shaped, and the spandrels are filled by small medallions and a beautiful diaper in relief. At the feet of Christ are two small figures; these represent the Virgin and her empire; and their smallness illustrates a principle in the practice of those times, held down even to the culmination of human art, viz., that of expressing the greatness of the character by comparative largeness of the figures. The monk, Theophilus, the best authority we have for the process of the early ages, devotes no less than seventy-nine of his short chapters to the goldsmith, showing us how much was required of him then. He was to grave with burin and compass; to execute base-reliefs and figures in repoussé,—that is, hammering the design from the back of the metal plate—in favorite and beautiful method in able hands. Of course he was to model in wax and other materials; to be informed in all metallurgical mixtures, and in the preparation of alloys for jewellery-work. After describing the tools, Theophilus enters on the technical part of the art; but it is not necessary to follow him.

The best period of gothic architecture was certainly not eminent in the production of the smaller works of elegance so necessary to the employment of civilized life. The furniture was heavy and rude,

smooth only on the edge; the walls or inventories show us how rare, and consequently how prized, were the household articles, exhibiting the hand of the skilled artist. On the contrary, the Renaissance spirit, while disposing itself over vast canvases, with life-sized figures, and introducing into the most sacred subjects its classical license, or raising masses of Corinthian porches, with polished windows, must be considered soulless and void to the last degree, but is truly beautiful when applied to decoration, in which no lofty purpose is involved. The motives and forms of construction and ornamentation, characteristic of the sixteenth century, are more elegant than those of any other modern history. The revival of the three great arts—gradual in Italy, more sudden and revolutionary in France and England, slow and late in Germany—could not fail to modify the style of design of every minor art very much for the better. Indeed, the past productions of the goldsmiths' work of the Alps were previously imitations of architecture.

At the end of the thirteenth century, when Nicola and Giovanni of Pisa had cast off the Byzantine yoke, the goldsmiths adopted the new beauties, metal sculpture made progress, and we suddenly find the goldsmiths in the highest regions of art. The school of Pisa was the first to distinguish itself, Nicola and Giovanni having many pupils in this work, particularly the brothers Agostino and Agnolo, and Andrea di Pisa (1440).

The two greatest monuments of the time are the altars of St. James of Pistoria, and of the Baptistery of St. John in Florence, where Ghiberti afterwards worked. For more than 150 years the most skilled goldsmiths were engaged, though irregularly, on these two works. Many men of noble artistic powers were occupied on similar labor; and among them Brunelleschi is known to have modeled two prophets in silver for Pistoria, but he resigned metal work, and became first the rival of Donatello, himself originally a goldsmith, in sculpture, and afterwards the superior and academy of the long career by raising the great cupola of the cathedral of Florence.

A little later, in 1446, Luca della Robbia emerged from the station of the goldsmith Leonardo; but of him we may speak hereafter. Before this date, Lorenzo Ghiberti, then twenty years of age, left the workshop of his father, and was on his way to Rimini to seek work, when recalled by the proclamation of the guild of merchants, he offered himself a candidate for the execution of the great doors of the baptistry, only one of the three doors having been already done by Andrew di Pisa.

This competition was one of the most notable that have ever taken place, as it was, no doubt, one of the earliest, among the competitors were Brunelleschi, Donatello and Jacopo della Quercia, who generously acknowledged themselves vanquished by the panel and design sent in by Ghiberti. The judges made their choice, and Ghiberti won the place, which perhaps he will ever hold, of the greatest base-relief sculptor in metal that the world has ever known. The superior productions of Brunelleschi and Ghiberti may still be inspected in the cabinet of bronzes of the Florentine Gallery. Laharte says Ghiberti owed his victory to the exquisite and finished execution of his bronze, which had been completed and touched with the greatest care, and it may be safely asserted that it was to his talent as a goldsmith that he owed his triumph in this encounter with the greatest sculptors of the fifteenth century. Nor Laharte ever relinquished his practice in the department in which he had been reared, but executed many artistic jewels, and left a memoir or himself and of the goldsmith's art.

While these and others left their early practice for different and more intricate spheres, as a pure goldsmith the highest success seems to have been attained—who executed the latest portion of the baptistry's high altar after Ghiberti had completed the gates. This monument is so jealously kept that it can only be seen

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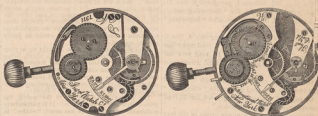
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1. Running down the ore with a flux. Minerals composed of copper and silver can be assayed either as silver or as copper ores, as the lead button that is obtained from the fusion with litharge is capable of being expelled if it has a suitable proportion of lead to the copper.

In the case of argentiferous regulus coming under the operator's notice, the mineral must be roasted previously. Metallic lead might be added as the lead-producing flux, but it is always preferable to use litharge free, or nearly free, from silver as the agent. It is easily melted and disseminated through the mixture.

The most convenient reducing agent is charcoal, reduced to the finest possible state of division. The fusing fluxes most commonly used, and almost the most convenient, are carbonate of soda and borax.

The four substances—viz., litharge, carbonate of soda, borax and charcoal—are all that are required for any silver ores that are likely to fall under the notice of the practical assayer, with the exception of galena, the assay of which will be described separately.

The first thing to do is to assay the litharge. To do this, take 1,000 grains and place them in a large warmed crucible with 200 grains of carbonate of soda, and 35 or 40 grains of charcoal; intimately mix with the spatula, and cover the whole with a layer of carbonate. Fuse at a low heat, and when fluid pour out the contents into a mould, and reserve the button of lead for cupellation.

The amount of silver must be noted, and the corresponding amount deducted from the actual assay. Having determined this, proceed as follows:

Place two crucibles to warm over the cover of the furnace, and meanwhile weigh out the following mixture:

Ore	100 grains.
Litharge	400 "
Carbonate	350 "
Borax	150 "
Charcoal	20 "

Intimately mix the whole on a sheet of glazed paper, and shoot the mixture into the warm crucible; shake the contents over, and take to grains or so of litharge on the point of a spatula, and powder over the top of the contents. Prepare two crucibles in this manner. Place the crucibles in the furnace, side by side, and peek them round them till they are completely enclosed. Take off one of the bricks at first from the top of the furnace, and fuse at low heat at first, winding up with a full red heat for five minutes; thoroughly fuse the slags: the whole operation is complete in about twenty or twenty-five minutes.

The great point to be observed in this part of the process is to keep the heat as low as possible at first, as silver lead is sensibly volatile at a high temperature.

When the contents of the crucible, which can be viewed through a small chink between the bricks, flows quite smoothly without bubbling up, the crucible must be seized with a pair of furnace-tongs, tapped once or twice on the side of the furnace to settle the contents, and poured immediately into a hot mould, previously rubbed with common black-lead to prevent the lead sticking to it. Allow the mould to stand for five minutes, and then invert the contents into a bucket of cold water. Allow to cool, and the slag will then come off with one or two taps of a hammer on the edge. The slag detaches itself much easier if the button is plunged into cold water before it is quite cooled. The lead button must now be cleaned by holding it edgewise on an anvil and tapping it gently with the hammer, occasionally dipping and cleaning it in water. Hammer it into a thick cube, and scratch on it the corresponding number of the packet sent to assay and set it aside for cupellation. If the ores should contain antimony, etc., the button may come out brittle, and perhaps break up under the hammer; if so, clean

the button as carefully as possible and place it in a scorifier, and add about half its weight of granulated lead and scorify as usual, to be hereafter described.

The above mixture will generally suffice to run down most of the silver minerals that are likely to come under the assayer's notice, though, of course, the quantity of lead must be varied according to circumstances, as in argentiferous regulus and galena. Sometimes when the ore is very hard, the flux will not run smoothly, but appears viscid and thick. In this case some mixed borax and carbonate may be placed in a copper shot and projected into the crucible, and the heat urged on for a few minutes.

Argentiferous Regulus is assayed as follows:

Calcine the ore first "sweet," or quite free from sulphur. Take 100 grains of the ore, and add the following mixture:

Litharge	1000 grains.
Carbonate	350 "
Sand	100 "
Borax	150 "
Charcoal	35 "

Intimately mix with the usual precautions. The sand is added to prevent the large quantity of litharge from attacking the pot, as it attacks the sand instead. A double quantity of litharge is added, in order that the excess of lead in the button may pass the copper contained in the regulus into the cupel. If a small quantity of lead, or, in other words, a small button, was cupelled, the copper would be so concentrated that the assay would not yield a silver button, but a silver and copper one, owing to there not being sufficient lead to pass the copper. This will be treated of presently under the description of the assay of alloys. If there is a difficulty of procuring borax, the same quantity of green bottle-glass answers the same purpose.

Galena, or Silver Lead, is assayed in precisely the same manner as if it was being assayed for lead only. The two following methods are the best, and, if carefully performed, very little lead is lost:

No. 1.—Ore	400
Carbonate	350
Borax	50
Argol	50

Intimately mix, and cover the top with some of the mixed carbonate and borax. Then take three large nails, or, better still, three pieces of hoop iron, and push them down to the bottom of the mixture in a triangular shape. Place the crucible, iron and all, in a furnace, and fuse at low heat for twenty minutes. Give about two minutes' strong heat at the end, during which you can remove the pieces of iron one by one, tapping them and washing them in the molten metal, to prevent globules of metal sticking to them. Then pour as usual.

No. 2.—Ore	400
Argol	100
Carbonate	400
Borax	200

Mix and cover as before; add the pieces of iron, and proceed exactly the same as in No. 1. If carefully performed, both these methods yield excellent results, particularly the first one. Of course, if the galena is extremely rich, half the quantity of ore may be taken, and the requisite proportion of granulated lead added to the assay.

SCORIFICATION.

We are enabled by this process to obtain an alloy of lead capable of being cupelled. The principles are exactly reversed; for whereas in the crucible assay the object is to reduce the oxide of lead to a metallic state, in the process of scorification the metallic lead is oxidized by being roasted in contact with the air. Scorification is the most convenient, cheap, and correct way of assaying silver ores, when properly performed.

METHOD OF ASSAY.

The scorifiers should not, be of the usual shallow shape, but deeper in proportion to their width: in fact the best form of scorifier may be compared to the end of an egg.

To be Continued.

MILLER BROS. MANUFACTURING JEWELERS, 11 MAIDEN LANE, New York. INITIAL GOODS A SPECIALTY!



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Choice Gold Pens, Cases, Holders, Toothpicks, &c.
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Opera, Nilsson, Guard and Vest Chains,
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Watches of a good class only, fully Warranted.
Neat and Stylish Watch Cases made to order.
Novelties in that line being continually introduced.

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Specialties, Chain & Band Bracelets & Opera Chains

Factory, Jersey City.

Specialties, Chain & Band Bracelets & Opera Chains

SMILLIE, DORRANCE & EDGE, Manufacturing Jewelers,

No. 5 Maiden Lane, New York,

Manufacturers of Chain Bracelets,

Necklaces, Opera Chains, etc., from their New Woven

Fabric Chain, 14 and 18 kt. only.

Nicoud & Howard is the name of a new watch importing house, just sprung into commercial existence. Mr. Arnold Nicoud was until quite recently a member of the firm of Salzman & Co., and Mr. H. Howard, late of the firm of T. B. Byner & Co. We take great pleasure in referring our readers to the advertisement which appears elsewhere, and trust that their success will be as great as it is deserving.

The bill introduced in the Legislature by Mr. Lawrence of New York, relative to those who loan money on diamonds and other valuable pledges, requires them to pay one thousand dollars for a license and limits the rate of interest they may charge to seven per cent, and in case of overcharge the principal of the loan may be forfeited, and that violation of the law may be punished with a fine of not less than one thousand nor more than five thousand dollars.

P. B. Gilbert, of the Whiting Manufacturing Company, died suddenly on the 17th ult., in Richmond, Va. The deceased was one of the earliest manufacturers of silversmith in this city and a prominent member of the Masonic Fraternity. His remains were conveyed to his family under Masonic Temple services, and now rest with the silent majority in the city of the dead, while the sighing of the winds and the murmuring of the willows sign his requiem.

Mr. Tiffany, of Tiffany & Co., has gone to Washington with a petition signed by the principal importers and dealers in diamond and diamond goods, asking Congress to reduce the import duties on diamonds from 10 to 5 per cent. It is claimed that the Government will derive a greater revenue under such reduction than from the present duties, the change will tend to put a stop to smuggling which is carried on by a large class of unprincipled dealers, and the great injury of the firms who have signed this petition.

The trade will regret exceedingly to lose from its active membership so pleasant and ever respected a member as Mr. Morris Falkenstein, who is compelled by continued ill health to withdraw from the well-known house of Falkenstein & Pollak. His record of twenty-seven years in the trade is a most honorable one. The business of the manufacture of gold chains and chain bracelets will be continued by Messrs. Pollak, so long of the old house, and Edward Dreyfus, whose standing in the trade, if not as long, is excellent, under the firm name of Pollak & Dreyfus, and they will settle in liquidation. They have our best wishes for continued success.

A telescope of immense proportions has been for some time past in course of construction at the Paris Observatory, but is still far from its completion. It was commenced in 1854 by M. Leon Foucault, but the death of that savant, and the deaths of 1870 and 1871, interrupted this work, which was subsequently resumed under the direction of M. Wolf. The power of the new instrument will exceed those of the Cambridge and Herschel telescopes, hitherto the largest known; its length will be forty-nine feet, and its diameter six feet six inches, while the dimensions of Herschel's were only forty feet by five feet.

ERNEST WILHELM PREUSSER, a young watchmaker, well known to many readers of this paper, died in New York on the 23d ult. The deceased was a native of Nassau, Germany, and left his native land very early age to pursue his fortune in the New World. He possessed a first class general education, and evinced a liking for physics, in chemistry, and the higher sciences of the Holographic Art, in some of which he excelled. His constitution was never robust, but till a short time previous to his death his general health was comparatively good, yet unknown to either himself or his intimate friends, time proved that that unrelenting and insidious disease consumption had been gradually doing its work. The deceased was a young man of sober habits and sterling integrity, and during the past year had rendered this Journal valuable service. His death will be deplored by all who knew him; and by none more deeply than the writer of these lines.

Trade Cossip.

Black Pearls are in great demand. An ancient case of insanity, "Time out of mind."

Turquoise is exceedingly fashionable with Parisian ladies.

With the growing taste for fine lockets and pendants the expense increases.

Fine pearls, if brought into contact with acids, giv, or scoldies vapors of all kinds are liable to discolor.

The Birmingham Optical and Needle Co. is the name of a new concern recently started in Birmingham, Conn.

Diamonds still sell at the crown setting, frequently made of platinum, which is nearer the color of a stone than either gold or silver.

Old silver ornaments are in such demand in Paris that when they are generally accepted they realize more money than modern gold jewelry.

A Providence Jeweler was observed trying to break a hole in the Malien Lane sidewalk by sitting down on it suddenly. The sidewalk is yet whole.

On the evening of the 28th ult., a fire occurred in the Jewelry Store of P. S. Reeler, on Eighth Street near Market, Philadelphia, loss estimated at \$3000.

Twelve thousand dollars worth of uncut diamonds, seized from Solomon Glayson in Nassau Street on a charge of smuggling, have been restored to the owner.

Moses, Kearney & Seaworth, 170 & 172 State Street, Chicago, are the sole agents in Chicago for Maron's Solignum. The trade is cautioned to beware of imitation.

A farmer sent an order to a London tradesman for a clock. He said he should prefer one made by Tommas Pegg, as all the best clocks in the neighborhood had that name on them.

The safe-conducts now used by the English party which show observations of the transit of Venus at Cairo, will, it is said, be presented to the Egyptian Government as a mark of appreciation for the kind offices rendered.

The diamond necklace and earrings presented by the Khedive of Egypt to General Sherman's daughter is now deposited in the Treasury vaults for safe-keeping. They are variously estimated at from \$50,000 to \$60,000; their real value is probably the former.

The Parisian ladies have adopted with great favor the new jewelry, which is made of glass, chateaux and Norwegian bates; they offset the old silver ones, and particularly those made with chains delicately worked in the tortoise pattern, which were fabricated in Venice during the Renaissance.

Mr. Zimmerman, a prominent Jeweler of New Orleans, committed suicide the morning of the 14th ult., by shooting himself in the head. His business complications are said to have been the cause of his death. His large stock of goods has been assigned to Mr. Pitt, of the old established house of Fitch & Chastillon, for the benefit of his creditors.

For some time past, the Post Office authorities have been puzzled by the disappearance of valuable packages of watches, jewelry, &c., that had just been sent in the mails. The mystery has just been explained in the arrest of three young men who drive the mail wagons, who have confessed that they had been their practice several months past, to rob the mail sacks intrusted to them, of packages containing valuables.

An alloy having a very fine and malleable grain, susceptible to a high polish and impervious to rust (which, while slowly resending gold, may advantageously replace that metal in a variety of cases) is made of 100 parts pure copper, 12 parts tin, 6 parts magnesia, 35 parts antimony, 3 parts quicksilver, and 9 parts bitartrate of potash. The copper is melted first, and the magnesia, antimony, lime, and bitartrate are successively added in small quantities. The tin in small pieces is then placed in the crucible, and the whole brought to fusion for 35 minutes, after which the alloy is allowed to cool.

OFFICE OF
NICOU & HOWARD,
14 JOHN STREET.

New York, January 14, 1875.
We have the honor to inform you that the Trade that we have formed a co-partnership for the purpose of importing watches and jewelry, under the name of "NICOU & HOWARD" (Chaux-de-Fonds, Switzerland). We shall hereafter have the exclusive control in this market of all watches bearing the names of *Fréd. Nicoud and Arnold Nicoud*.

We have a facility for the production of these watches in Europe, where they are manufactured by *Fréd. Nicoud*, the father of our *Mr. Arnold Nicoud*, whose goods have been favorably known to the fine watch trade of this country for nearly twenty years, and who for the last seven years has been the manufacturer of the finest grades of watches bearing the name of *Arnold Nicoud*.

Although we shall make a specialty of the "Nicoud and Arnold" in all the different grades and sizes, we are prepared to fill orders for our customers for watches bearing their individual names and styles.

These goods have earned for themselves a high reputation wherever introduced, and their durability, price and excellent performance will commend them to the attention of buyers in search of this class of goods.

Very respectfully,
AROLD NICOU,
Late of the firm of Salzman & Co.
H. HOWARD,
Formerly of the firm of T. B. Byner & Co.
and late with L. A. Nicoud & Co.

SHEPARD, LE BOUTILLIER & CO.

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We are constantly receiving invoices of the latest production of London, Paris, Vienna and Berlin, to which we invite the attention of buyers.

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GILT, BRONZE & DECORATED GAS FIXTURES.Fine Marble & Bronze
CLOCKS.Bronze Figures and Ornaments in Greatest Variety,
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We had the above-mentioned Pictures and Glass Chandeliers, for design, excellence of workmanship and finish, but also for the best location in the country and we may say, in our judgment, excelled by no other company in the world.

We recommend a MEDAL OF SPECIAL AWARD FOR CHANDELIERS AND GAS FIXTURES.
"Medal of Special Award confirmed." (Signed) JOHN W. CHAMBERS, Secretary.

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We are now prepared to fill orders for our new line of **Stem Winding & Stem Setting Watches**, embracing all our popular grades, and our Full Plate Movements universally known as APPLETON, TRACY & CO., WALTHAM WATCH CO., P. S. BARTLETT, and WM. ELLERY, to which we have adapted a strong and serviceable Stem Winding and Setting attachment, involving an additional cost of \$12, \$10, \$9, and \$8, respectively, (Trade List). At the same time we are keeping up our usual assortment of KEY WINDERS, as heretofore. The above Stem Winders are uniform in size and interchangeable in cases. This interchangeable feature is of great importance, and a decided advantage to dealers, as it enables them to display a varied assortment from a small stock of Goods.

The Riverside grade of Stem Winders in both Ladies' and Gents' sizes are exceedingly cheap and popular movements. The Ladies' Watch is the best, for the money, made in this country. Its small size, neat appearance, and reliability, commend it to purchasers.

The Gents' size is the only American made Stem Winder that can be PROPERLY CASED as an Open Faced watch, with the figure XII of dial on a line with the pendent. The addition of these two grades to the roll of American Watches is an immense stride in the right direction, whilst their quality, price, etc., will doubtless add greatly to the increasing popularity of American Stem Winding and Stem Setting Watches.

The above movements are now in stock, and orders for them and the various grades and styles of Silver Cases, together with the newest designs of Gold Cases, bearing the manufacturer's guarantee, can be filled at once.

 The above Silver Cases are made of Standard Coin Silver, stamped  on the lids.

Office, No. 1 Bond Street, New York.

BOSTON OFFICE, No. 8 Summer Street.

CHICAGO OFFICE, No. 5 Tribune Building.

LONDON OFFICE, No. 16 Hatton Garden.

Finger Rings.

To pass from the Church to the law we must not omit to mention the well-known serjeant's ring. Every serjeant-at-law, on being sworn in, presents rings of pure gold with a motto on them, to such persons as come to the inauguration feast, to the law officers, and certain other officials of importance. The values of the various rings are proportioned to the rank of each recipient, and one of very large dimensions, the motto inscribed in enamel, is given to the serjeants. On the admission of fourteen serjeants, in 1737, 1409 rings were given away, at a cost of £773, and besides this number there were others made for each serjeant's own security to be given away to friends at the bar, attorneys, &c, which came to more than all the rest of the expense. Lists of the mottoes on many of these rings have been printed in 'Notes and Queries,' but as they are not of any great interest, we do not insert them here, merely mentioning Lord Eroughan's suggestion of a motto on a certain occasion. Some baristers that Brougham did not think much of wished to be made serjeants, and the ex-chancellor suggested that the most appropriate motto that could be found for their rings would be the old legal word *scilicet*.

Rings with punning devices or rebuses, heraldic emblems, &c., engraved upon them, were introduced early in the fifteenth century, and soon became very common. In the old newspaper *Mercurius Publicus*, for November 29th, 1660, there is a curious and interesting story which illustrates our subject. On the disbarring of a certain regiment at the Restoration, the men were given a full week's pay in addition to their arrears, when they all unanimously resolved to buy each man a ring with the week's pay, the pay of which should be the *King's Gift*. Certain stones were set in rings, with a special meaning in superstitious times, as we shall see further on, but in later days all kinds of stones have been used, to suit the varied fancy of the wearer. Giardietti rings, of a floriated design, in which colored stones represented flowers, were used at one time as pendants. At the commencement of the nineteenth century hortiaria rings, which were set with several variously colored stones, were fashionable. Swift, writing to Pope, respecting Curll and the 'Dunelad,' says:—'Sir, you remind me of my Lord Bolingbroke's ring, you have embalm'd a grail in amber; and Pope himself refers to this substance, which is one of the most ancient of ornaments, in the following lines:—

'Pretty! in amber to observe the forms
Of hairs, or straws, or dirt, or grubs, or worms;
The things we know are neither rich nor rare,
But wonder how the devil they got there."
Matter, which is expected in so fanciful a manner, the moral qualities attributed to the stones vary greatly according to different authorities, and moreover, other gems than those mentioned above have been set apart as emblems of the different virtues.

Rings, which were supposed to charm away all the ill of life, were once worn, and the Anabians have a book written exclusively on magic rings called 'Solohat.' The most wonderful of all these rings was that one, which is said to have been found in the belly of a fish, and was transferred in regular succession from Japhet, the father of Enoch, to Solomon. This ring of Solomon's was that with which refractory Gims were sealed up in jars before they were thrown into the sea, as we read in the 'Arabian Nights.' The ring of Gyges king of Lybia, was also of great note. He is said to have found it in a grave, and when he wore it with the stone turned inwards, he was rendered invisible to human eyes. Many other rings, however, have been supposed to possess the same power as that of Gyges, and it was a belief in the Middle Ages that rings with certain cabalistic words upon them rendered their wearers invisible.

Rings were used among many different nations as charms and talismans against the evil eye and demons, against debility, the power of the flames, and most of the evils inherent to human nature. Sometimes the virtue existed in the stone, and sometimes in the device or inscription or magical letters engraved upon them.

Many rings made of wood, bone, or other cheap material were manufactured

in large numbers at Athens, and gifted with whatever charm was required by the purchaser. Kresotes, the tyrant of the Phocians, carried about with him two rings, which he struck together to divine by the sound emitted what he had to do or what was to happen to him.

The Greeks engraved yams with mystic figures, all of which were supposed to have their value. The word *Analeptia* was a favorite inscription, and the names of the three kings of Cologne, or the wisdom of the East, viz., *Jasper, Malachite, and Balazar* were used as a powerful charm. Reynard the fox boasts of the virtues of the ring he possessed with the three names that Seth brought out of Paradise when he gave his first Adam the oil of mercy, and tells how, whoever bears those three names, shall never be hurt by thunder or lightning, nor by witchcraft, nor be tempted to sin, nor catch cold, though he lay three winters' nights in the fields in the snow, frost, and storm.

Devotional rings, with the names of Jesus, Maria, and Joseph engraved on them were used as a preservative against the plague. The various figures engraved on rings all had their hidden meaning. Thus Pegasus or Hellephron was good for warriors, as it gave them boldness and swiftness in flight. Orion made the wearer victorious in war, and Mercury gave wisdom and persuasion. The representation of St. Christopher was an amulet against sudden death, particularly by drowning, and that of *Amorosa* was considered a charm between man and woman. Hercules strangling the Nemean lion cured the colic, and protected the combatant who wore it.

A copper ring with the figure of a lion, a crescent and a star worn upon the fourth finger, was considered to be a cure for the plague. A dog and a lion together preserved the wearer from dropsy or pestilence, and the hare was a defence against the devil.

A figure of the imaginary cockatrice was worn as a talisman against the evil eye. This creature was supposed to be produced from a cock's egg, and is described by Sir Thomas Brown in his 'Vulgar Errors' as having 'legs, wings, a serpentine and winding tail, and a crest or comb somewhat like a cock.' Its own was so deadly as to kill by a look—

'I say then but 't' (eye)
And that bare word 't' shall poison more
Than the death darting eye of cockatrice!'
— *Romeo and Juliet*, iii. 2.

In the Lothborough collection is a very remarkable ring, on which is represented a toad swallowing a serpent, which illustrates an old superstition. There is a proverb that 'a serpent to become a dragon must eat a serpent,' and the same metamorphosis was supposed to take place with other crawling creatures, as appears in many allusions in the poets, so that this toad may be expected to turn into a dragon.

Rings composed of different substances have been commonly employed for superstitious purposes. Thus rings of gold were thought to cure St. Anthony's fire; and Marselius, a medical writer, says that the reign of Marcus Aurelius, directed the patient afflicted with pain in the side to wear a ring of pure gold, inscribed with Greek letters, on a Thursday at the decrease of the moon. The ring was to be worn on the right hand if the pain was in the left side, and on the left hand if the pain was in the right side.

Brand acquaints us that in Berkshire a ring, made from a piece of silver collected at the Communion, is a cure for convulsions and fits of all kinds. If struck with on Easter Sunday, its efficacy is greatly increased. A silver ring made of five six-pences collected from five different batches of gold, and was covered by the hands of a smith, who is a batchelor, will cure fits. One of the persons who give the six-pences are to know for what purpose they are collected. A ring made from silver contributed by twelve young women, constantly worn on one of the fingers, cures epilepsy. Trallian, in the fourth century, cured the colic with the help of an octagonal ring of iron on which eight words were engraved, and by commanding the bile to take possession of an unfortunate lark.

To be continued.

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1866.

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KEY AND STEM WINDING AND SETTING
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A Solution for Preserving and Protecting the Polish and Color of Gold and Silver while under process of Hard-Soldering.
The most delicate Engraving and Chasing is perfectly Preserved from Tarnishing when treated with this Solution, and the article on which it is placed may be heated to a red heat without fear of Discoloration.
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This solution is not intended to preserve said color, but will in a great measure protect it.

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CAUTION.—In consequence of unscrupulous parties manufacturing and offering for sale an Anti-Oxidizing solution, put up in style similar to mine, and even copying my Label and Circular with a view to deceive the Trade. All purchasers are requested to ask for McLANE'S Anti-Oxidizer, and take no other. Be sure that the bottle is sealed and stamped McLANE'S ANTI-OXIDIZER, none are genuine without it.

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A large stock of Works in General Literature, Illustrated Books, and Works on Art, Architecture, Decoration, and Design.

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1847---ROGERS BROTHERS---XII.

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Manufacturer of NEWEST STYLES

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ARCHER & PANCOAST M'FG. CO.

Designers & Manufacturers of Bronze, Crystal and Gilt

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For Table and Ornamental use, and articles unique for Presentation,

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WHERE DEALERS visiting the city are invited to call and examine our wares which will be found of every variety and style known to the trade.
WHEN ORDERS are sent by Mail time will be saved by sending them direct to the Factory at Wallingford from whence all goods are shipped.**SILVER****FILIGREE JEWELRY**

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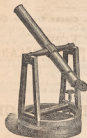
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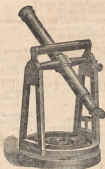
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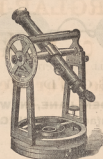
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A Guide to the prominent Wholesale Houses in the Watch, Clock, Jewelry and kindred branches of Trade in New York.

Clock Companies.

American Clock Co.—Manufacturers of Clocks of all kinds. Salesrooms, No. 281 Broadway.

Asaola Brass & Copper Co.—19 & 21 Chin street, New York.

Cookes, Benjamin J.—Wholesale Dealer in all kinds of Clocks and Regulators, No. 127 North 3d Street, Philadelphia, Pa.

Krocher, F.—Clocks and Regulators of every description, No. 8 Courtland Street, N. Y.

United States Clock Co.—Henry Torkins & Son, 3 Cortlandt street, N. Y., Manufacturers of Fine Regulators and American Clocks.

Waterbury Clock Co.—M. Bailey, Treasurer, Maudsl and Johnson, No. 4 Cortlandt Street, N. Y., No. 100 Clark Street, Arcade Building, Chicago.

Wood, James—Manufacturer, Importer and Dealer of Fine Regulators and Clocks of every description 6 Courtlandt street, N. Y.

Cornals and Coral Jewelry.

Ericson Bros.—Established 1859—Importers of Coral Jewelry, 19 John street, N. Y. Manufactory, 39 San Carlos a Chaga, Naples, Italy.

Lawsen & Cranbury—Manufacturer Fine Gold & Coral Jewelry: Coral jewelry altered, refinished and repaired, No. 63 Nassau St., N. Y.

Cameo Cutters, Etc.

Bonnet, L.—(Successor to Bernard & Bonnet), Cameo Lithenians, No. 599 Broadway, New York.

Chronometers.

Ellis, John & Co.—Standard Marine Chronometers, Transits for Watchmakers' Cars, No. 110 Wall street, N. Y.

Diamonds.

Bernhard, A. & Co.—Manufacturing Jewelers & Importers of Diamonds, Jewelry, &c., 109 Broadway, Gilsey building, N. Y.

Blodgett, E.—Importers of Diamonds, No. 182 Broadway, N. Y.

Fara, Henry—Importer of Diamonds, No. 9 Maiden Lane, N. Y.

Morch, Jacob—Importer of Diamonds, Pearls, French & Italian Stone Combs, Amethysts, Opals, and Precious Stones. Diamonds in speciality. No. 23 Maiden Lane, N. Y.

Nersisimian, E. Aug.—Importer of Fine Diamonds, No. 5 Maiden Lane, New York.

Diamonds and Diamond Jewelry.

Smith & Hedges—Importers of Diamonds Exclusively, and Manufacturers of Fine Diamond Jewelry, 1 Maiden Lane, cor. Broadway, N. Y.

Taylor, Charles & Taylor—Importers Diamonds and Diamond Jewelry, 5 Bond street, N. Y.

Diamond Setters, Etc.

Fried, S.—Manufacturer of Fine Jewelry, and Diamond Setter, 33 John street, N. Y.

Hayden & French—Manufacturers of Fine Jewelry and Diamond Setters, No. 65 & 67 Nassau street, N. Y. N. B.—Particular attention paid to repairing in all its branches.

Enamellers, Etc.

Orr, Jas. C.—Enameler on Fine Jewelry, Jewels, Bells, &c., Enamelled in colors, Pearl Bracelets (a specialty), 71 Nassau Street, N. Y.

Engravers and Die Sinkers.

Dolbey & Wood—Engravers & Incrusters of Precious Stones, 109 & 121 Broadway, Room 25, New York.

Fackner, Edward—Carver, Engraver and Chaser on Jewelry, Mourning, Lettering, &c., No. 19 John street, N. Y.

Heming, Albert J.—Die Sinker & Engraver, 212 Centre street, N. Y. Dies for Jewelers and Silversmiths, Engraving Plates, Seals, &c.

Kass, Charles—Engraver Die Sinker & Designer for Jewelry, &c. 14 and 18 1/2 Shanks and Hanks for Rings &c., 41 Madison L. N. Y.

Park, William—Stone Seal & Cameo Engraver, and Die Sinker. Masonic Devices and Engraving for Incrustation, 200 Broadway, N. Y. Room 145.

Schleicher, Ch.—(successor to Wm. Eck) Die-Sinker, Engraver, Chaser and Tool Maker, 183 William street, N. Y.

Schuller, J. Danl.—Stone Seal Engraver, Arms, Crosses, Initials and Monograms engraved on Stone Seals, &c., No. 71 Nassau Street, N. Y.

Electro Platers.

Jessuthor, P. A.—Gold and Silver Electro Platers & Fine Golds Colorists, Brasswork and Gold Jewelry specialty, 71 Nassau St., N. Y.

Jessant, P. A.—Gold and Silver Electro-Plater and Brass Colorist, Gilding and Repairing Watch Cases, specialty, 63 Nassau street.

Normandean, P. A.—Electro Gold & Silver Nickel Plater. Coloring Gold and Silver work a specialty, No. 120 Nassau Street, N. Y. Sole Agent of New York Nickel Plating Company. Licensed by United Nickel Company.

Nickel Plating.

Scherrers—Nickel Plate Works. Plating on all metals by an improved solution, 42 Deq St.

Fancy Goods, Clocks, Bronzes, Etc.

Mays, Alex. M. & Co.—Importers of London, Paris and Vienna Fancy Goods, Clocks, Bronzes, Mantel Boxes, Diamond Watches, Jewelry, &c., 33 Maiden Lane, N. Y.

Milrichs, C. P. A.—Importer and Dealer in French and English Fancy Goods, Clocks, &c., 29, 31 & 33 Park Place, N. Y.

Magnin, V. J. Guadin & Co.—Importers of Clocks, Broom, Mantel Boxes & Rich Fancy Goods &c., 62 Broadway.

Shepard, Le Boulillier & Co.—Importers of Fancy Goods, Clocks, Bronzes, &c., No. 10 Maiden Lane, N. Y.

Gold Chains, Etc.

Beck, T. & Son, Manufacturers of Fine Gold Chains and Chain Bracelets, 10 Liberty place, near Maiden Lane, N. Y.

Falkman & Pollak—Manufacturers of Gold Chains with Patent Safety Swivel Attachment, No. 4 Maiden Lane, N. Y.

Kaufmann Bros.—Manufacturers of Gold Chains, and Chain Bracelets, 26 John street; Factory, 72 1/2 Bell street, N. Y.

Lobnitz, Albert—Manufacture of Fine Gold Chains. All goods warranted, No. 33 Maiden Lane, New York.

Smille, Dorrance & Edge—Manufacturers of the Colibrated Wove Fabric, Chain and Chain Bracelets, 5 Maiden Lane.

Gold Pens, Etc.

Altkin, Lambert & Co.—Manufacturers of Choice Gold Pens, Cases, Holders, Toothpicks, &c., 14 & 16 Maiden Lane, N. Y.

Todd, Edward & Co.—Manufacturers of Gold Pens, Pens, Cases, Tooth Picks, &c., 633 Broadway, N. Y. Factory, Brooklyn.

Gold Rings.

Bowden, Joseph E.—Manufacturing Jeweler, Solid Gold Rings a specialty, No. 11 Maiden Lane, New York.

Ely, W. H.—Manufacturer of Solid Gold Rings of every description. No. 98 Nassau Street, New York.

Hair Jewelry.

Frankie, H. C.—(late Charles Frankie & Co.) Hair, Hair Jewelry & Hair Pins, Importer of Alluring Copper. Sample books always on hand, 161 & 163 Broadway.

Miller, H.—Artist in Hair and Jewelry, 159 Broadway, up stairs, N. Y. Established 14 years.

Jewelry Cases, Fancy Boxes, Etc.

Altenberg, C. & Co.—Manufacturers of Russian and Morocco, Jewelry and Silverware Cases, Fancy Goods, &c., 5 Bond street, N. Y.

Brum, Chr. E.—Manufacturer of Jewelry Boxes, Trays for Show Cases, &c., 62 Chatham street, N. Y.

Dahlm, W.—Manufacturer of Cases for Jewelry and Silverware, No. 33 Nassau Street, N. Y. Show Case Trays, &c., at the shortest notice.

Prickson, Samuel C.—Manufacturer of the newest styles of Cases and Trays for Silverware, Jewelry, Watches, &c., 180 Broadway, N. Y.

Koch Henry—Manufactures of Fine Jewelry Cases, also Boxes for Surgical & Mathematical Instruments, 2 Duane street, upstairs, N. Y.

Steinle & Haemmer—Manufacturer of Fancy Boxes for Jewelry and Silver Ware, 66 Nassau St. Formerly of the Colibrated Adjustable Boxes.

Stur, L.—Manufacturer and Importer of Cases for Jewelry, Watches, Silverware, &c., 33 John street, N. Y.

Wigges & Froelich—Manufacturers of Fine Morocco Cases for Jewelry, Watches Silverware, Trays and Porcelain Inlay Trays, &c. No. 60 Nassau Street, N. Y.

Jewelry-Fine.

Aldin, Lambert & Co.—Manufacturers. General stock of Reliable Jewelry, 14 and 15 Maiden Lane, N. Y.

Baldwin, Barton & Peterson.—Manufacturers. Jewelry, No. 1 Bond street, N. Y.

Bail & Bernard.—Manufacturers of the Self-Adjusting Band and Gold and Silver Bracelets a specialty. No. 9 John Street, N. Y.

Barthman & Strad.—Manufacturers of Fine Jewelry. Seal and Ring Rings a specialty. Orders promptly attended to. No. 183 Broadway, N. Y.

Blaugier, B.—Importer of Fine Jewelry, Lockets, Crosse, Neck Chains, &c. No. 183 Broadway, N. Y.

Brown, Cook & Co.—Manufacturers of Fine Gold, Enamelled and Plain Lockets, No. 191 Broadway, N. Y.

Burch, DeMatt & Coughlin.—Manufacturing Jewelers, 9 John street, N. Y.

Carter, Hoffman & Dodd.—Manufacturing Jewelers, 1 Bond street, N. Y.

Co. Adams & Stevens.—Manufacturers of Fine Jewelry, Lockets a specialty. Office, old No. 9 Maiden Lane, N. Y.

Demmett Bros.—Manufacturers and Importers of Fine Jewelry, Crosse and Onyx Lockets, Silver Buttons and Sets a specialty. Old No. 9 Maiden Lane, New York.

Fitch & Chatterton.—Successors to Merrill, Fitch & Chatterton—Manufacturers of Fine Jewelry. Chain, Bracelets, and Cuffs. No. 19 John street, N. Y.

French, P.—Manufacturer of 18k and Fine Stone Rings (also Diamond Work), Jobbing attended to with dispatch. No. 14 John street, New York.

Goddard, John M.—Manufacturer of Jewelry—Rings and Fine Jewelry a specialty. No. 25 Maiden Lane, New York.

Griffith, H.—Manufacturer of Fine Jewelry. Straps and Buttons a specialty. Jobbing attended to. Nutley Alley, Adams street, Brooklyn, N. Y.

Hartman, P.—Manufacturer and Importer of Fine Gold, Diamond and Filigree Silver Jewelry. No. 36 Maiden Lane, N. Y. P. O. Box 4,354.

Horton & Chase.—(Successors to R. D. Horton). Manufacturing Jewelers, No. 18 Broadway, (Room 14) N. Y. Factory, Providence, R. I.

Kimball & Kittle.—Manufacturers of Fine Gold Jewelry, 28 Bond street, N. Y.

Kuba, George.—Manufacturing Jeweler, 28 Bond street, New York.

Kuba & DeWitt.—Manufacturers of (14 and 18 karat and Roman Gold) Band Bracelets, and Importers of Lockets, 18 Bond street, N. Y.

Leason, John D.—Manufacturer of Fine Jewelry. 29 Fulton street, N. Y. Plat and Halfround Gold Bracelets a specialty.

Miller Bros.—Manufacturers of Fine Jewelry. Lockets, Silver Buttons, Studs, &c., etc. 11 John Lane, New York.

Miller & B.—Jewelry, 65 Nassau street, (Room 11, 34th floor) N. Y. Jewelry, Masonic Emblem and Badges made to order.

McMurry, David R. D.—Manufacturer of Fine Enamelled Jewelry. Half Sets, Studs and Silver Buttons, 148 Fulton Street, N. Y.

Mulford, Hale & Cottle.—Manufacturers of Rich Jewelry, Watchmaking Building, 1 Bond street, N. Y.

Oliver, Richard.—Manufacturer Jeweler, Old and Intricate articles of Fine Jewelry made to order, repairing done for the trade, 11 John St., N. Y.

Oppe & Kleinsch.—Manufacturers of Seal Rings, Studs & Silver Buttons, 30 Bond street, N. Y. Orders promptly attended to.

Oshamp, Clements.—Wholesale Jeweler, 125 Vine street, Cincinnati, Ohio.

Owens, C. & S. A. Co.—Manufacturing Jewelers. Office, No. 5 Maiden Lane, New York.

Ross & Son.—Importers & Dealers in Jewelry. Watches, Gold and Silver Jewelry, and Spectacles, 75 Nassau Street, New York.

Schmied, Valentine.—Successors to H. W. Rame & Co. Manufacturer of Roman and Etruscan Jewelry, No. 20 John Street, N. Y.

Soale, H. & Co.—Manufacturers of Fine Jewelry, Patent Self-Locking Bracelets a specialty, 71 Mulden Lane—factory, 10 Bond street.

Spadone, R. & Co.—Manufacturers of Fine Jewelry, Chains, &c.—Importers of Watches, &c. 56 Broadway.

Spies & Roseng.—Manufacturers of Fine Jewelry, Diamond and Silver Jewelry, 100 Broadway, N. Y.

Swannerton, J. C.—Manufacturers of Fine Jewelry, Diamond and Silver Jewelry, 100 Broadway, N. Y. Factory, Newark, N. J.

Theiler, Ernest.—Manufacturer of Fine Gold Sets and Children's Wearings, 175 Broadway, N. Y.

Whelan, A.—Manufacturer of Diamond and Fine Jewelry, Masonic Jewels, Badges, Souvenirs, &c., 29 John street, N. Y.

Winer Brothers.—Manufacturers of Gold Chains and Fine Jewelry, 125 Fulton Street, N. Y.

Jewelry—Shell, Gift, etc.

Olsen Wilson.—Importer of Jewelry, Fancy Goods, Wallaby, Shell, Gift, Toys, Shell, &c., &c. No. 1 Maiden Lane, N. Y.

Hedstrom, Chas. G.—Manufacturer of Shell and Gold Jewelry, 100 Broadway, N. Y.

Hirsch, C. F. A.—Importer of Amber and Sea Jewelry, 29, 31, & 33 Park Place, N. Y.

The Thayer Manufacturing Jewelry Co.—Successors to T. Thayer & Co. Manufacturers of Jewelry, Specialty: Celluloid Jewelry, No. 229 Broadway.

Jewelry's Tools and Findings.

Diamond & Co.—Manufacturers of Jewelers' Findings, Paper Boxes, Cards, Tags, Closures, Tools, &c. 100 Broadway, N. Y.

Fraser & Co.—Importers of Swiss, French, Swiss, German, Swiss Shell Tools, Pins and Studs. Wire for Watchmakers. Jewelers, etc. Chatham street, N. Y.

Lapidaries.

Fox, M. & Co.—Practical Lapidaries and Importers of Precious Stones, 100 Broadway, N. Y.

Agate Mortars, No. 1 Maiden Lane, N. Y.

Kordmann & Michel.—Lapidaries, Importers of Precious Stones, 100 Broadway, N. Y.

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Pelland, M. F. & Co.—Importers and Dealers in Musical Boxes, Jewels carefully repaired. 60 Broadway, N. Y.

Opticians.

Burbank, Bond & Co.—Manufacturers of Spectacles, Gold and Silver Frames, in gold, silver, steel, &c. 14 16 Maiden Lane, N. Y.

Kell, John.—Manufacturer of Gold Eye-Glasses, and Spectacles, 100 Broadway, N. Y.

Landberg, A.—Successor to L. Black & Co. Importers of Spectacles, 100 Broadway, N. Y.

Ruding, Walter.—Repairing Spectacles, Eye Glasses, and Spectacles, 100 Broadway, N. Y.

Stranah, Richard.—Manufacturer of all kinds of Spectacles, and Spectacles, No. 27 Maiden Lane, N. Y.

Suttie, Wm. J.—Manufacturer of Eye Glasses and Spectacles, in gold, silver, steel and steel, 100 Broadway, N. Y.

Rings and Shanks.

Burbank, Bond & Co.—Manufacturers of Solid Gold Rings, 14 Maiden Lane, N. Y.

Bryant & Hartley.—Manufacturers of Rings, 100 Broadway, N. Y.

Knap, C.—Manufacturer of 14 and 18 karat Solid Gold Rings, 14 Maiden Lane, New York.

Cook, John.—Manufacturer of Silver Tea Sets, Pitchers, Wafers, Cups, Goblets, Spoons, Forks, Knives, etc. 4 Liberty Place, N. Y.

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Whiting Manufacturing Co.—Manufacturers of Silverware, 181 Broadway, N. Y.

Silverware.

Manhattan Plating Co. 24 John street, N. Y. Fine Nickel Silver and White Metal Plating. Repairs & re-plating on the premises.

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Ross & Son.—Manufacturers of Reliable Silver Plated Ware. No. 200 Broadway, New York.

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Becker, John.—Manufacturer of Show Cases, Jewels always on hand, 10 Howard street, N. Y.

Helly, P. M.—Manufacturers of all kinds of Show Cases, Counters and Refrigerators, 45 & 49 Nassau Street, N. Y.

Kraft & Hoffmeister.—Manufacturers of Metal Show Cases, Jewelry trays always on hand, 8 & 10 North William street, N. Y.

Kraus, Frederick.—Manufacturer of all Sizes and Styles of Show Cases in Metal & Wood, 175 Chatham street, N. Y.

Spectacle Case Manufacturers.

Richardson, Wm.—Manufacturer of Spectacle Cases in all Branches, 40 Fulton street, N. Y.

Kosman, A. & B.—Manufacturers of Leather Spectacle & Eye Glass Cases, 81 Nassau street, N. Y.

Thermometers.

Tagliacozzi, Giuseppe.—Thermometer, Barometer and Hydrometer, 202 Post street near Beekman, N. Y.

Thimble Manufacturers.

Burbank, Bond & Co.—Manufacturers of Gold & Silver Thimbles, 14 and 16 Maiden Lane, N. Y.

Thimbles, No. 1 Maiden Lane, N. Y.

Thimbles, No. 1 Maiden Lane, N. Y.

Walking Cane.

Frederick, J. P.—Manufacturer of Fine Gold and Silver Walking Cane. 18 John Street, New York.

Watch Companies.

American Watch Co.—Roberts, Appleton, Agents, Watch Building, Bond St., N. Y.

The Philadelphia Watch Co.—No. 618 Chestnut Street, Philadelphia, Pa.

The International Watch Company.—Factory, 173 Broadway, New York, and 303 N. Ave. Dame Street, Montreal, Canada.

Watch and Chronometer Repairer.

Queen, James.—Watch and Chronometer Jeweler and Patent Maker, 31 Nassau street, Fostre inserted in Platin, Balance, Staffs, &c.

Watch and Clock Springs.

Brooch & Bauvard.—Manufacturers of Watch, Clock, Chronometer and Musical Box Stock Springs, 79 Nassau street, N. Y.

Watch Importers, Etc.

Abray, J. A.—Importer of Watches, No. 68 Nassau Street, N. Y.

Alkins, Leinster.—Importer of Watches, No. 68 Nassau Street, N. Y.

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Bartles, Chas.—Watch and Chronometer Maker, 10 John Street, N. Y.

Bodine, G. M.—Importer of Watches and Jewelry, 100 Broadway, N. Y.

Borguini Brothers.—Importers of Watches from Switzerland, 100 Broadway, N. Y.

Bynner, T. B. & Co.—Importers of Watches and Jewelry, 100 Broadway, N. Y.

Conover David P. & Co.—American Watches, 100 Broadway, N. Y.

Cress & Bequelin.—Importers of Watches, Watch and Jewelry, 100 Broadway, N. Y.

Corvoisier, Wilcox & Co.—No. 12 Maiden Lane, N. Y.

Elder, R. H.—Successor to G. A. Haguenin, Importer of Fine Watch and French Clock Materials, No. 64 Nassau street, N. Y.

Glatz, Charles.—Importer of Watches—Dealer in American Watches and Silver Cases, No. 1 Maiden Lane, New York.

Haldiman, R. A.—Importer of Watches, Tools and Materials, 60 Nassau St. N. Y.

Kahn, L. & M.—Importers of Watches, No. 10 Maiden Lane, New York.

Keller, L. H.—Successor to G. A. Haguenin, Importer of Fine Watch and French Clock Materials, No. 64 Nassau street, N. Y.

Lutz, L. A.—Successor to Lutz Bros.—Importers and Manufacturers of Watches, see moments and specialty, factories in Lutz & Co. 71 Nassau Street, N. Y.

Mather, P. H.—Importer of Watches, No. 5 Maiden Lane, N. Y.

Mather, P. H. & Co.—Importers of Fine Watches and Silver Agents for the H. L. Matthe's, 115 Fulton Street, N. Y.

Niceau & Howard.—Importers and Manufacturers of Watches, No. 14 John street, N. Y.

Plagel, Henry P.—Importer, Manufacturer and Repairer of Fine Watches and Movements, No. 58 Nassau Street, New York.

Priest, Fuller & Lawrence.—Importers of Watches, Diamond Jewels, Gold Chains, etc. No. 15 Mulden Lane, N. Y.

Quinche & Krugler.—Agents for the Borel & Courvoisier Nickel Movements, 15 Mulden Lane, New York.

Stein & Brother.—Importers and Jobbers of Swiss and American Watches, Chas. Jewellery, &c. No. 28 Nassau street, N. Y.

Siem Brothers & Co.—Importers of Swiss Watches, Diamond Jewels, Gold Chains, etc. No. 65 Nassau Street, N. Y.

Taylor, Olmsted & Taylor.—Importers and Manufacturers of Watches, 100 Broadway, N. Y.

Wasson, P.—Importer of Watches, Materials, Tools, &c. Sole Agent for Deussen's Main Springs, 52 Nassau street, N. Y.

Watch and Clock Repairers.

Alkins, Leinster.—Importer of Watches, No. 68 Nassau Street, N. Y.

Bartles, Chas.—Watch and Chronometer Maker, 10 John Street, N. Y.

Bodine, G. M.—Importer of Watches and Jewelry, 100 Broadway, N. Y.

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Essay on the Compensation Balance.

ON CLOCK AND WATCH WORK FOR COUNTERACTING THE INFLUENCE OF TEMPERATURE.

By F. KUNSEN.

The balance of a portable time-keeper is the part of the instrument that measures time, and if time is to be measured to perfection all the vibrations of the balance must be performed in the same length of time. But independent of irregularities that may arise from the train and escapement, the vibrations of a balance are influenced by the temperature. Metals are weaker and more expanded in heat than in cold, through the expansion of the balance alone, watches went about twenty seconds day slower in summer than in winter, and this imperfection greatly increased after invention of the balance-spring, when, in addition, a rise in temperature weakened long and slender springs that regulate the vibrations of the balance. The first invention made in England for the correction of errors arising from temperature was at the year 1708, by a British horologist, named Harrison. It was known some thirty years previously that brass expands and contracts in length by changes in temperature. Of this knowledge Harrison availed himself, and by joining a thin slip of brass to a thin slip of steel he formed a lamina, which on account of the extra expansion of the brass, by increase in heat, bent to the side of the steel, and vice versa. This he put in connection with the index, and by a proper arrangement he secured through changes in temperature in moving the index sufficiently towards the right or slow to make his watch keep the same rate in different temperatures. Harrison's watch by these means became a valuable instrument in finding longitude, and he was rewarded by a Government grant of £20,000.

Although Harrison's invention was a great improvement, it was defective, as any action in the setting length of the balance-spring destroyed the isochronism of the vibrations of the balance; and as about the same time a French horologist, named Breguet, invented a better way, by expansions and contractions of the balance, his invention has been adopted, and is now used in all superior watches and portable clocks. The correction for temperature is called the "compensation"; and a balance used for purpose is therefore called a "compensation balance." The compensation balance, however, undergoes some modifications since it was first invented; and it is now usually made in the following manner:—The steel is turned to a proper size, and the hole is stopped with chalk or black lead, to prevent it from getting filled with oil, it is but into a crucible with as much brass as may be required for covering it in melted. The brass, in melting, unites to the steel, and the piece is afterwards turned and filed, reduced to two arms of steel, and a standing-up ring composed of brass and steel, with the brass outside, and of about twice and a half the thickness of the steel. This ring is cut through in two opposite places, at a little distance from the arms, and on the two movable parts of the ring, which are called the rims, are placed, opposite to each other, two pieces of brass of equal size and weight, which have grooves that fit on the rims, where they are held fast in their positions by a screw on the inside. These are called the compensation weights, and are about one-half of the weight of the balance. Brass, in heat, expands more than steel, and when a whole weight of the balance. Brass, in heat, expands more than steel, and when the compensation weights are carried nearer to the centre, and by a proper adjustment of these weights, which pass through a greater space the nearer they are placed to the end of the rims, a watch or chronometer can be made to keep the same rate in different temperatures, or, as it is generally called, in heat and cold. In watches and all chronometers used as pocket watches, and frequently in the larger kind, called time chronometers, instead of two weights, screws with heavy heads are used, placed at the end of each arm, on which is put a screw nut made of brass or platinum. In half watches these are likewise screw taps, or studs, with screw nuts. These were called the timing and position screws, and are used for regulating the chronometer to time, and for making it go alike in different positions. When a balance has compensation weights, a position screw of platinum can be put in each of the compensation weights. Figs. 1 and 2 represent the two forms of compensation balances, with auxiliaries, which will be hereinafter described, attached to them.

(Fig. 1.)



The velocity with which a balance vibrates is a compound of the strength of the balance-spring and size and weight of the balance, and ordinary watches are regulated by altering the length of the balance-spring. But as this way of regulating destroys the isochronism of the vibrations, chronometers have no index, but are regulated by the timing screws, by which the centre of gyration is brought nearer to or farther from the centre of motion. If the screws are screwed in, the balance moves quicker, and if the screws are screwed out, the balance moves slower. But the balance vibration is a turn and a quarter. But it is better for a pocket chronometer that the vibration is a little more or a little less, because on account of the action of the escapement the side friction on the balance-pivots becomes a little more or a little less, and the rate of a chronometer, when given in different positions, but the balance vibrates more than a turn and a quarter, by making the balance a little heavier in the arm that is upwards in the position in which the chronometer goes slowest, or a little heavier in the lower part, if the vibration is less than a turn and a quarter, are enabled to make a chronometer keep the same rate in each of the positions. But if the balance vibrates just a turn and a quarter, the screwing in or out of any of the timing or position screws only makes the chronometer go faster or slower in every position. For his reason I consider magnetism cannot alter the rate of a chronometer when the vibration is a turn and a quarter, as the weight will be the same whatever part is turned towards the north; and that, therefore, this extent of vibration is the best for a marine chronometer or any other time-keeper in which the balance vibrates in horizontal position.

As chronometers are made of different sizes, and the balance consequently driven by vibrations of different degrees of strength, a balance must be of a proportionate size of weight for the required degree of vibration. These are found by previous experiments. In English chronometers the different parts of the movement are always the same proportion to the size of the frame, as with a proper main-spring and the usual distance caused by the unlocking in the escapement, the following weights and sizes of balances may be used:—

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a movement 24 inches in diameter the ring of the balance may be 1 inch in diameter, and the balance may weigh about 3 gr. 15 to. To a 2-inch movement the ring of the balance can be 3/4 inch in diameter, and the balance may weigh about 2 1/2 gr. For an 8-days chronometer of the usual construction, with the plates 24 inches in diameter, the balance ring can be 1 1/4 inch in diameter, and the balance may weigh about 4 dwt. 10 gr. If a balance has compensation screws, the centre of gyration gets a little further from the centre of motion; the ring can then be made as much smaller as the above one thickness of the ring. As a rule, a watch or pocket chronometer that goes 30 hours can have the balance as large as the spring-barrel, and half as high, and, according to its size, it will then weigh from about two-fifths of a pennyweight to one pennyweight. If, however, the balance is a little heavier than these weights, it makes scarcely any other difference than that the balance takes a longer time to get up to its full vibration.

I must here observe, through causes to which I shall presently refer, the compensation is seldom perfect for all ranges of temperature, and chronometers are therefore adjusted to go alike in the changes of temperature in which they are to be used. The best adjustment for a temperate climate is to make them go alike in 50° and 90° Fahr; for temperature is to be used in a hot climate, in 60° and 100°. The adjustment for temperature is made with the balance vibrating in the horizontal position, and is not to be relied on as being perfect unless the chronometer is kept one week in low, the next in high, and then again a week in low temperature. I must add that the rims of a balance of the size of the drawings are generally from 1/25th to 1/10th of an inch thick, 3/20ths of an inch high, with the brass 24 the thickness of the steel, and that the compensation weights, or screws, on each rim weigh from 1 dwt. 8 gr. to 1 dwt. 12 gr. If the balance is smaller, everything is reduced in the same proportion. But to these proportions I shall refer again presently.

THE IMPERFECTION IN THE COMPENSATION.

I have in the preceding pages given a description of compensation balances as usually made, and their adjustments; but after a balance has been carefully adjusted in the manner described there is still a residuary error, caused by temperature, and that cannot be corrected by any alteration in the compensation weights. We find that chronometers go faster in middle temperature than above or below, that the difference in rate increases more and more in extreme temperatures and in freezing, and 100° generally amounts from four to five seconds per day. The manner in which this imperfection arises has been explained by some writers, and men who have succeeded in getting a great name as horologists have not only described it as arising through balances following the same law as pendulums, but have likewise attributed it to resistance in the rims, and to the compensation weights not moving in a straight line to and from the centre of the balance. But neither of these ways of describing it can be correct. If balances followed the same law as pendulums, and the centre of gyration required to be four times further from the centre of motion to make a balance vibrate as slow again, it would have a tendency to make chronometers go faster and not slower in extreme temperatures. For if a pendulum is made a certain quantity shorter it makes a greater alteration in the rate of a clock than if made the same quantity longer; and, therefore, if the compensation weights moved sufficiently in for heat they would not move sufficiently out for cold. The consequence would be the chronometer would go faster in cold; and when the error was divided it would go faster both in heat and cold than in middle temperature. Again, if a chronometer, through resistance in the rims, went slower in heat, it would, from the same cause, go faster in cold. The compensation weights might be required a little further out on the rims than what would be necessary, there was no resistance; but this could not make a chronometer go slower in extreme temperatures; and that it cannot be caused by the compensation weights not moving in a straight line to the centre will be seen by looking at Figure 3.

(Fig. 3)

If A represent the arms of a balance, the centre and CD one of the compensation rims, standing circular with the centre a middle temperature of 60°, and we suppose that rim, by a change in temperature, to move a certain number of degrees below middle temperature, moved out to E, it would be the same number of degrees above middle temperature moved to F; for CE and F are of the same length as CD when measured along the lines, and are part of circles of which one is as much larger as the other is smaller than the circumference of the balance in middle temperature. When we now measure the distance from the centre to E and F, we find that a compensating weight, placed on the rim, moving from D to F must move through a greater space and approach the centre of the balance in a greater ratio than in moving from E to F; and when the error was divided, it would be faster both in heat and cold than in middle temperature.*

It is therefore evident that the imperfection does not arise from the balance, but from a varying or expansion of the balance-spring by increase in heat, which causes an increase in the friction on the balance-pivots and retards the vibrations of the balance. In this, and in no other way, can we explain it.

There is, however, a way in which the compensation will always be better than with balances as usually made; and this is by giving larger angle of action to the rims in the same changes of temperature. If we again refer to Fig. 3, and we suppose that in the same number of degrees below middle temperature as before, the compensation weight instead of moving to E, moved out to G, and when the error was divided, we again measure from the centre to H, D, and G, we find that the compensating power of the balance is now still greater in high temperature in proportion to low, which is the thing that is wanted. This additional action of the rims can be obtained in three ways. The rims can be made thicker, or longer, or it is also possible to vary the thickness of the balance, the compensation weights, for the same weight of balance, must be reduced by one-half of the usual weight. For by measuring on a large scale, we find the compensation weights are the best made when placed between 90° and 100° from the axis. But the rims can also be of the usual thickness and lay flat, when there will, of course, be room to make them much longer.

Having explained the true cause of the imperfection in the compensation, and the means by which the compensation can be made perfect, it is almost unnecessary to make any observations on the different forms in which balances may be made, as any horologist will be able to see that the rims may be placed in many ways. Still, as the subject is interesting and useful, I will give a description of a balance invented by myself, and by which I have obtained a perfect compensation.

* This cannot be seen very distinctly on so small a drawing; but those who will take the trouble to measure on a large scale will find my statement correct.

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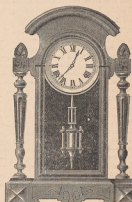


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Many years ago, in considering if any further improvements could be effected in chronometers, I came to the following conclusions:—First, The compensation would be improved by giving the rims a greater angular action in the same temperatures; second, the rims ought never to be interfered with, and the timing and position screws should, therefore, be on independent arms. Third, the brass, being melted on the steel, ought to be hammered or compressed by burishing. Fourth, the laminae ought to be bent considerably to the side of the steel, and after being bent to the proper shape, they should be heated to a pale red color. Fifth, to have the compensation weights always acting from the same point on the rims, they ought to be on studs. Sixth, that changes in the oil might have lost influence on the rate, a balance ought to be as heavy as the pivots would carry. Seventh, long and thick rims would be stronger than short and thin. After coming to these conclusions I made a balance for a 5-inch movement, of which the following is a description:—

The arms of the balance are of steel, and from the end of one arm to the end of the other is 15 inch. The rims are lying flat; and each rim is composed of two laminae screwed together at one end, but perfectly free of each other. The lower lamina has the brass on the top, and the upper one has it below. The rims commence at the end of one arm, go to the end of the other where the rims are joined, and back to where they commence. Here a piece goes in over the arm, and carries a stud, on which is a screw nut, that weighs 1 dw. 12 gr. These studs are 15 inch apart. The rims are (as near as I am able to measure) 2-20th of an inch broad, 1-30th of an inch thick, and have the brass on-and-a-half the thickness of the steel.* The timing screws are on four independent arms, fastened by two screws to the middle of the large arms, and the whole balance weighs 8 dw. By this arrangement the rims, being about double the usual length, and about seventy-five times longer than thick, will carry the compensation weights through about three times the usual space. A chronometer with one of these balances was, several years ago, sent to the Greenwich trials, where it obtained the highest place, and kept the best rate of any chronometer ever before brought to the trials; the number of which, in the aggregate, amounted to more than 1,200. Its greatest variation during twenty-nine weeks' trial was five seconds and five-tenths, and its variation in many weeks in succession was only a fractional part of a second. I may add that I have adjusted other chronometers with similar balances and found the compensation equally perfect.

Chronometer-makers, through not having been able to find out the true cause of the imperfection in the compensation, or a better way of correcting it, have taken refuge in auxiliaries to the compensation. But though chronometers in which I have used auxiliaries have obtained some of the highest places at the Greenwich trials, I have no great confidence in these appliances. By using an ordinary good balance-spring and by a proper attention to the principle I have explained, chronometers can be made to keep within a fractional part of a second, faster or slower, the same rate in freezing, and in 100°, as in middle temperatures, and the compensation may therefore, for all practical purposes, be considered perfect. As, however, auxiliaries are now in general use, I will just observe that these may be made in the ways:—

The rims may be made to expand against springs, made of such a strength that they gradually give way, and placed in such a position that they cause no friction at the point of contact; or they may consist of little extra rims, fastened under the heads of the timing-screw studs, and when against a regulating screw, from which they bend in when the chronometer runs to go slower. An auxiliary can also be made by a lamina screwed on the side of the balance-screw, which has a small screw at the end, that touches the balance-spring when the chronometer begins to go slower. One of the first kind

of these auxiliaries, and invented by myself, is represented in Fig. 1. The screw at the end of the foot of the spring has a conical head, by which the position of the spring is regulated.

In Fig. 2 is represented one of the second kind. This can be made to act either in high or in low temperatures, by placing the brass of the rims inside or outside. These rims are generally half as high as the large rims, and a quarter as thick; and for a balance of the size of the drawing they carry a screw at the end that weighs from 2 to 3 gr. I must, however, add that I consider auxiliaries are better in low than in high temperatures; for when a chronometer has been going some time in very high or very low temperatures the rims generally set a little, through which the chronometer alters its rate in middle temperature. If, therefore, the auxiliaries act in high temperatures, they add to this fault; but if they act in low, they retract. (*British Horological Journal*.)

Selections from Sauvier's Traite d'Horlogerie.

Translated for The Jeweler's Circular, BY A. HODGE.

MAKING THE PIVOTS.

We use for this purpose a piece of round steel free from flaws, hardened in oil and drawn to a blue color. We turn it down until it just goes in the small cannon, and finish with oil stone dust, and polishing file until it goes in about $\frac{1}{2}$ of the length of the small cannon. The face of the plug is then turned flat, and the shoulders roughed out. The face of the plug can be polished with the screw-head tool. The same course is followed with the large plug, only it must go deeper in the cannon. We must be careful that the plugs are straight and cylindrical, for if they were conical, they would split the cylinders open. The fitting of these plugs must be very carefully executed so that the least blow of the hammer will drive them to their place, or else, especially with the small plug, it will move while finishing the cylinder.

The small plug is first driven in by holding the shoulder with a pair of pliers, in the vise, the cylinder being driven with the small tool shown in C Fig. 23. The end of this tool must be



thin enough to free the small out, or else there would be danger of breaking the cylinder. The same is done with the large cannon. Cylinder makers have different ways of putting in the cylinder plugs. Some put the tool in the vise with the cylinder resting on it, and holding the plug with a pair of tweezers strike it light with a hammer until it is in its place. Others will only push in the plugs with the side of a thin file without using the hammer, and others again use a hollow punch the hole being large enough just to admit the shoulder of the plug, and drive it to its place by putting the tool in the vise and the cylinder on it.

The cylinder is prepared for turning by filing the centres in the same manner as we do for pivions, and then turning the two points to a perfect cone. The following is the method used in factories at the present time: They put a collar on the cylinder and use a centre so made as to have a hole in just large enough that the cylinder does not pass through. This hole is then made conical and when the cylinder is in the lathe, the shoulder projects outside the centre, then a hair bow is used and a well sharpened graver, and turn the point of the plug round by going with the

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graver, from the point towards the cylinder, but never the other way. This method requires a good deal of care and attention, but once used to it, it is the quickest and the safest.

For this operation it is best to fill the cylinder with shellac, and when the cylinder is round we can turn the shoulders to the proper size and shape. The cylinder is then cleaned and verified with the depthing tool.

The brass shoulder for holding the balance, or the hub as we will call it, is made of hard brass, and is first turned down to near the proper size on arbor; it is then adjusted on the cylinder so as to be driven about the half of its own thickness, which is done with the same tool used for putting in the plugs, the hub resting on the riveting stake.

The hub is then turned the proper size and height, except the rivet for the ball-ance which will be left a little larger than necessary to be finished after the pivots are made, so as to have the balance true and of the proper height.

The cylinder is now ready for pivoting, which is done after having marked on each shoulder the right place for the extreme end of each pivot. For this we take the pieces of the old cylinder and put them together with shellac, or if we have not that, we can use the moveable square or a cylinder with a sliding plug, (both shown in D and C, Fig. 24), and easily find out with them the position of each pivot and that of the balance. Otherwise we can use the small rule prepared for making the cylinder. See Fig. 22. We remember that the distance, A, represents the space between the face of the small plug and the inside of the jewel hole in the potance; we hold the rule on this jewel and with callipers measure the distance between I and the outside of the jewel, then resting one of the arms of the callipers on the face of the small plug of the cylinder, B, Fig. 22, the other jewel indicates the end of the lower pivot, which we mark very carefully. Now the potance and balance bridge being put in their place on the plate, we take the piece of length from the outside one jewel to the outside the other, and resting one arm of the callipers in the mark we have made in the lower shoulder, the other arm shows the end of the top pivot, which we again mark very carefully.

We now take a piece of brass which, being put under the centre wheel, will be thin enough to allow the necessary freedom between that wheel and the balance, and measure from the top of that piece of brass to the outside of the lower jewel, and we have the proper height for the balance seat measuring on the cylinder from the end of the lower pivot. Next we take a small brass collet and fasten it on the cylinder with shellac, and turn the pivot with the graver fine enough to flush them with the balance, and avoid all shellac. In riveting the balance we must use a riveting stake with the holes conical up to the top so as to avoid breaking the cylinder. One of the arms of the balance must be exactly opposite the back of the cylinder. The cylinder with a sliding plug, as shown in B, Fig. 24, being a very useful tool, we will give the proper instructions how to make it, and those following our advice will be amply paid for their trouble in making two or three of them.

For more solidity, the cylinder and lower plug are made in one piece, the cuts not very deep nor very high; the cylinder is then drilled from the top only to receive the large plug which can be either screwed in or made sliding with a set screw on the side, a brass shoulder showing the place for the hairspring collet and the balance can be adjusted on it so as to slide up and down, which will be useful to find the proper height for the balance. Every watchmaker will understand the utility of such a tool without any further demonstration.

To be continued.

On an Improved Method of Constructing the Dead Escapement of Clocks.

By BENJAMIN LEWIS VULLIAMY.

Continued.

It would be impossible for any clock to go with the pallets shaped, as drawn, Fig. 24 and 25; but it does not follow that pallets could not be made, preserving the same centres of motion, which would perform; and at first sight, and upon a small scale, appear as mechanically correct as the escapement drawn Fig. 23. Such pallets are represented, Fig. 26 and 27, applied to similar wheels; taking over the same number of teeth, and acting on the same centres as in Fig. 24 and 25. These pallets will be led an equal angle by the action of the wheel on each pallet, and lead the pendulum an angle equal to the angle it is led with the centre of action of the pallets in its proper place, as in Fig. 29.

FIG. 26



ed to similar wheels; taking over the same number of teeth, and acting on the same centres as in Fig. 24 and 25. These pallets will be led an equal angle by the action of the wheel on each pallet, and lead the pendulum an angle equal to the angle it is led with the centre of action of the pallets in its proper place, as in Fig. 29.

FIG. 27



This effect is produced in Fig. 27, by increasing the angle of lead of the pallet, A, and diminishing that of the pallet, B; and it will be observed, that though the two angles, B I C, and D I E, the angles the pallets are led, are equal to one another, and consequently, that the pendulum will be led an equal angle by the action of the wheel on each pallet; yet that the angle, A I C of lead as drawn of the pallet, A, is greater than the angle, B I C the pendulum is led, by the angle, A I B, representing the difference between the two; and the angle, D I F of lead as drawn of the pallet, B, is less than the angle, D I E the pendulum is led, by the angle, F I E the difference between the two. Consequently, the total difference between the angles of lead as drawn, is an angle equal to the two angles, A I B and F I E.

FIG. 28



A similar remark applies to Fig. 28, with this difference, that the same effects take place on the reverse pallets; the angle of lead of the pallet, A, is diminished, and that of the pallet, B, increased; the angles, B I C and D I E, the pallets are led by the wheel, as in the former case, are equal to one another; but the angle, A I C of lead of the pallet, A, is less than the angle, B I C the pendulum is led, by the angle, A I B; and the angle, D I F of lead of the pallet, B, is greater than the angle, D I E the pendulum is led, by the angle, F I E; and the difference between

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the two angles of lead as drawn, is an angle equal to the two angles, A B and F I E. This alteration of the shape of the pallets, requires a corresponding alteration in the shape of the teeth of the wheel, which must be longer and more undercut, and consequently, weaker than when the centre of motion is determined, as shown by Fig. 23.*

It now remains to point out the difference between the pallets, as drawn Fig. 23, and Fig. 26 and 27. In Fig. 23, the angle of lead of the pallets as drawn, and the angles they are led are one and the same, and equal to each other; and consequently, the pendulum is led at an angle equal to either of these angles, by the action of the wheel on each pallet. In Fig. 26 and 27, this is not the case, if it is true, the pendulum is led at an equal angle by the action of the wheel upon each pallet, the angles, B I C and D I E, Fig. 26 and 27, being in each figure equal to each other, but the angles, A I C and D I F of lead of the pallets, are of necessity, to enable the escapement to perform, drawn different from each other and different from the angle the pendulum is led; the one being greater and the other less than the other. The consequence of this is, that the length of the inclined planes of the pallets is also very different, the one being much longer than the other, which renders the friction upon the two unequal, and probably, in the same ratio, as the difference in their lengths, and consequently, the impulse received by the pallets must, from that cause, independent of any other, be unequal. That this is an evil of the first magnitude in the dead escapement, it would be a waste of time to demonstrate; it is only sufficient to observe, that the impulses received by the pallets being unequal, the lengths of the arcs of vibration of the pendulum will be unequal, and consequently, performed in unequal times.

The angles, A I B and F I E, Fig. 26 and 27, in each figure, being equal to each other, it will be found in all cases, that the excess of the angle led by one pallet, above the angle of lead of the same pallet as drawn, will be equal to the excess of the angle of lead, over and above the angle led by the other pallet.

Supposing the distance between the centres of action of the pallets and the scape-wheel, determined as above described, see Fig. 23, and lines drawn from the points where the teeth of the wheel act upon the rests of the pallets, to the centres of motion of the wheel and the pallets, they will form the one an obtuse, and the other an acute angle; and both angles will

differ an equal quantity, half the thickness of the pallet from a right angle. Now, in principle, the most advantageous point of action for the wheel upon the rests of the pallets, is at right angles to the two centres of motion; but as it is impossible that the points of action on the two rests should form right angles with the centres, (for were the one a right angle, the other would be the thickness of a pallet greater or less than a right angle) it follows, that the best construction is, that in which the action of the teeth of the wheel on both rests differs the least possible quantity from a right angle, and is that which will have the least tendency to wear; and as observed by M. Berthoud, No. 1325, "the most favorable position."

There is a construction of the dead escapement, in which the point of action of the wheel upon the rests may be at right angles to the centres on both pallets, and consequently, the rests at equal distances from the centre of motion of the pallets; but in that case, the impulse upon the two pallets is not at an equal distance from their centre, but the thickness of a pallet further from the centre upon one pallet, than upon the other. See Fig. 21. The impulses upon the inclined planes of the pallets being at an unequal distance from their centre, is a most serious defect, and the cause that this construction of pallets is no longer employed.*

Another advantage resulting from the mode of placing the centre of action of the pallets as above proposed, is that the wheel will require to be undercut the least possible quantity; for, if the centre of action of the pallet is raised above its proper centre of motion, it will cause the wheel to be more undercut than it need otherwise have been, to free the pallet upon the inner rest on which the wheel acts, otherwise the point of intersection of the inclined plane, and rest of the pallet will cause the wheel to recoil, by coming into contact with the face of the tooth of the wheel; and if the centre of the pallet is brought lower than the proper centre of motion, it will cause the wheel to be more undercut to free the pallet upon the outer rest on which the wheel acts, otherwise the action of that rest will occasion the wheel to recoil (though the effect is very much less considerable in this case than in the former); consequently, the proper centre of action of the pallets is the most advantageous to the shape of the teeth of the wheel; for, as has been before noticed, the

less the tooth of the wheel is undercut, the shorter, and, consequently, the stronger, they will be. It may be further observed, supposing the centre of the pallets to be in its proper place, that the greater the number of the teeth of the wheel the pallets take over, the less the teeth of the wheel require to be undercut. It must, however, be concluded from this, that the number of teeth the pallets take over can be too great; for I believe the contrary to be the case, inasmuch as it is more advantageous in practice to communicate the impulse to

the pallets at a moderate distance from their centre of motion, which will be the case when they take over six, seven, or eight teeth, than at a very considerable distance, as in the case when the take over eleven, twelve or thirteen teeth.

To conclude: the great advantage of the mode of determining the distance between the centres of the wheel and pallets

* In the case of the centre being placed as in Fig. 26 and 27, and the angle of lead of the pallets supposed to be originally drawn as represented in Fig. 26, the escapement will yet perform, and the pallets lead an equal angle to one another, by the action of the wheel on each pallet, by only altering the angle of lead of one of the pallets, as originally drawn. This is shown, Fig. 26, where the centre of the wheel and pallets are placed, and all the parts, the angles of lead of the pallets, excepted, are drawn as in Fig. 27; the angle of lead of the pallets, A I B, as drawn in Fig. 26; but the angle of lead of the pallet, B I, is distinguished to an angle sufficiently small to be led by the wheel an angle equal to the angle the pallet, A I, is led with an angle drawn similar to Fig. 26, and the two centres placed as in Fig. 27.

In this figure, see Fig. 26, the angles the pallets are led, and consequently the pendulum, though equal to one another, are less than in Fig. 23, and 28, where they are purposely made to lead angles equal to the angle led, Fig. 23, at the same time they are led angles equal to one another.

If, instead of the angle of lead of the pallet, A I B, being drawn as in Fig. 23, the angle of lead of the pallet, B I, had been so drawn, the angles of the pallets, A I B and D I E, would be equal to the action of the pallet, B I, and similar effect would result as to the difference between the angles of lead of the pallets as drawn, and the angles led by the action of the wheel on the pallets, and consequently, the angle the pendulum would be led, would be considerably greater than in Fig. 23, instead of less, as in Fig. 26.

* This is correctly true, in the case of the pendulum being supported a beam and vibrating at short angle; or in the case of a pendulum with a very bold support, such as a knife edge, as the majority of the old clocks were made; but in practice, in the case of a seconds' pendulum, and still more, a two seconds' pendulum, and a heavy bob, the power of gravity will very nearly overcome the difference in the impulses, and the necessary equality of the impulse must, in a certain degree, be judicious, particularly when very accurate performance is required.

In the case of the anchor escapement, as applied to watches, the evil would probably be greater and more felt, and cause the arcs of vibration of the balance to be very unequal.

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and laying down the lines of the escapement, as above described, consists not only

in enabling the escapement to be made with the least possible drop, and consequently, with the least loss of power, and with the action of the wheel and the friction up on each pallet as equal as it can be in the dead escapement made according to the usual construction with the wheel between the pallets, but on its being of general application, and equally correct whatever may be the size of the wheel the number of its teeth, or the number of teeth the pallets are made to take over.

In the above, the drop of the escapement has only been mentioned incidentally, and no allowance was made for that part of the action of the escapement, which by clockmakers, is termed the drop, or beat. In the dead escapement, in common with all other escapements, the drop is an unavoidable evil; and it is sufficient to observe, that the more correctly in principle and accurately in execution, the escapement is made, the less will be the quantity of drop requisite, and, consequently, the less the quantity of power lost.

In the plate of Mr. Cunningham's work, the number of teeth taken in by the pallets is from three to thirteen, not from two to twelve as stated in the text, and is marked in Fig. 29, represents the tangents drawn, taking from two to twelve teeth as figured in the text. Fig. 30 taking in from three to thirteen teeth as represented in Mr. Cunningham's figure.

It is worthy of notice that in the case of taking in thirteen teeth, the distance between the centers supposing the tangents drawn from the points of the teeth (see Fig. 30) is not exactly one and half diameter of the wheel, the distance determined by the supposed rule of Graham's, but a little more.

Curiosities of Clocks and Watches.

By EDWARD J. WOOD.

In a newspaper of 1678 appeared the following advertisement:—"Lost or stolen the 3d instant, a Gold Watch with a steel Chain, the Case studded with Gold, and lined with pink coloured Sattin, a bunch of small green taffeta ribbons tied to it. Who can give notice thereof to Mr. Richard Cooke next door to the Star Inn in the Strand near Charing-cross, shall have 40s. or if it be bought, there money again with content. The Watchmaker's name is Henricus Toun."

In the account of charges for work done by a goldsmith in February, 1679, we find the following:—"Item, for dressing a watch keey, 2s."

In the "Autobiography and Anecdotes by William Tassell, D. D., 1681-1692, published by the Camden Society in 1853, we read:—"After this (1680), I never was without money as long as I stayed in the university. I bought never 1 books, clothes, a silver-plated sword, a gold watch, and many cups, besides a great number of bows and arrows, with which I exercised myself sometimes, and at small games, in short, whatever my desire could fancy I had."

In the South Kensington Museum is a gold watch, the case of which is enamelled in blue with a border of flowers in colour and enamel. The dial-plate and interior of the case are enamelled; in the latter is an oval medallion with a figure of Minerva seated. The maker's name is "Pietr Wreschak, Haghe, 1680." The diameter is one inch and three-eighths. This watch was purchased at the Bernal sale for 6s. Also a gold enamelled watch, the maker of which was Pierre Duhamel, 1680. The height is one inch and a half, and the width one inch and a quarter. This article like

wise was bought at the Bernal sale for 7s. 12s. Also a carriage-watch, with a silver dial and richly-engraved and perforated gilt-metal case. The diameter is three inches and a quarter. The watch was purchased for 4s. Also a clock, or travelling watch, in gilt metal, with a red leather case, five inches square. The height is two inches and three-quarters. The article was purchased for 8s. Also a silver carriage-watch, the outer case of which is embellished with the story of Alexander and Diogenes. The inner case is chased and perforated with arabesque ornaments. It is believed to be Augsburg work, about 1690; its height is four inches and a half, and its width four inches; and it was bought for 14s.

In the "London Gazette" for October 21st to 24th, 1699, was the following advertisement:—"Lost the 21st instant between the Hay Market near Charing Cross and the Hammer in Queen Street near Chopside, a round Gold Pendulum Watch of an indifferent small size, showing the hours and minutes, the Pendulum went with a strain Spring, it was made by Henry Jones, Watchmaker in the Temple, the Out-Case had a Cypher pin'd on it, and the Shagreen much worn. If it comes to your hands, you are desired to bring it to the said Mr. Jones, or Mr. Sing, a gold-smith in Lombard Street, and you shall have two Guinea Reward."

At a meeting of the British Archaeological Association, held on December 19th, 1867, Mr. Baskcomb exhibited some articles which had been found in excavations in the Manor House, Chislehurst, Kent. Among them was a silver watch which was discovered in a small cupboard that had long since been built up in a wall passage. This watch was of the second half of the seventeenth century, and an inch and a quarter in diameter. The face was covered with a convex glass; and the dial, of brilliant enamel green ground, was of a bluish enamel, was surrounded by a circle of white enamel, on which the hours were marked in Roman numerals, and the half-hours with dots in black. The gilt hands were elegantly perforated, as was likewise the case. On the plate was engraved the maker's name, "Romaine & Romen." The metal case was covered with black leather, decked with knot-work and numerous rosettes of silver piqué. Romen was once famous for its watches, and the Hubert family seem to have been the chief makers there during the seventeenth century, Noel and the two Elzems being its most noted members. The productions of Romen are less known than those of the Huberts.

At a meeting of the above-named Association, held on December 30th, 1869, Mr. Henry Godwin, F. S. A., of Speen Hill, Newbury, exhibited a handsome silver watch, of the second half of the seventeenth century two inches and a quarter in diameter. The face was elegantly chased, the hours in Roman figures, and the minutes in Arabic numerals, being filled with black enamel. Beneath the dial was a kidney-shaped aperture, exposing a portion of the balance-wheel and hair-spring; and on the margin of this opening was engraved, "Rich. Rooker the maker." In the centre of the flat, solid, silver-gilt back-plate the plate was repeated thus:—"Richard Rooker, London, 325." This number was also stamped on the inside of the case.

At a meeting of the Archaeological Institute, held in 1847, Miss Barrett submitted for inspection a singular double-faced watch, the under side of the silver case of which was fashioned like the shell of a nautilus. The maker's name appeared in the interior, "Salomon Chesnon, Blois." The dial-plate was engraved with landscapes, figures, and foliated scrolls. From the character of its ornaments, the date of this article was assigned to the latter part of the seventeenth century. It is engraved full page size in the Archaeological Journal, vol. v. p. 83. At a meeting of the last-named Institute, held on May 31st, 1854, Mr. J. E. Rolfe exhibited a small watch made by "Salomon Chesnon, à Blois." It had no hands, the hour being indicated by an escheteon engraved on a circular plate, which revolved within the circle showing the hours; this escheteon was charged with the following coat:

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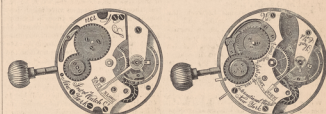
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Proceed as follows:—
Mix 500 grains of granulated lead with 50 grains of the ore to be assayed. Place the mixture in a scorifier, and cover with 300 grains more of granulated lead; over the whole put as much borax (anhydrous) as you can, and place the scorifier in the strongest heat of a good muffle for at least thirty minutes. If the slags are not liquid, add a little more borax, and urge on the fire for ten minutes more. When the slags are quite liquid, which generally occurs in about forty minutes, wrap up four or five grains of powdered anthracite in a piece of paper, and drop it into the scorifier while in the muffle. Wait till the anthracite has burnt off, which will be in about five minutes, and then pour immediately into a mould.

The object of adding the anthracite is to reduce any metal that may exist in the slags, and thus save the trouble of examining the slags subsequently.

In case the operator has a chloride of silver ore to assay, carbonate of soda must be added to the mixture to prevent sublimation.

In case argenterious regulous is the substance under consideration, 1000 grains of granulated lead must be employed in the same quantity, viz., 50 grains, of the ore.

Generally speaking, about ten or twelve times the amount of lead is required, but galena scorifies with a very much smaller proportion, three or four parts being sufficient. Very often it happens that the contents of the scorifier will not start roasting, but the slag sticks and does not move; this arises from the furnace being too cold; a little glass of borax wrapped up in paper and dropped in generally sets the assay on fire. When borax is used the slag surrounds the metal like a ring, which is continually diminishing, and at last the whole bath is completely covered with liquid slag; the fire ought then to be pushed on to its hottest. There ought always to be sufficient lead left to form a slag, which completely covers the button when this latter is poured out. There is no difficulty in performing this method of assay; the great points are to have the furnace hot enough, and not to pour the contents out until they are quite liquid.

When poor ores are under treatment, the crucible method is the best, as only 50 grains can be used in the scorification process, and, consequently, unless the assays are taken simultaneously, the resulting button of silver is small; but when very rich ores, and more particularly rich copper ores, are operated upon, scorification is very useful, as in the crucible method much copper is reduced with the lead, so that a very large quantity of lead is necessary in order to pass the copper into the cupel.

The muffle cannot well be too hot for this operation; the right heat is when you can just see the back of the muffle which is white. The most common fault is having the muffle too cold.

Supposing that the operator has to determine the silver contents of copper regulous; the best way of proceeding is as follows:—

Warm two scorifiers; weigh out 50 grains of the regulous into each, with 1000 grains of granulated lead and some borax as usual, and pour. Place the two buttons thus obtained in a fresh scorifier, and scorify till they are completely covered with fused slag. Then cupel the resulting button.

CUPELLATION.

This operation depends on the property a metal has of absorbing the oxide of lead produced during the operation, leaving only the gold and silver remaining.

The first thing to do is to thoroughly dry the cupels, which can be conveniently done by placing them in the furnace while it is heating; if not thoroughly dry, the contents of the cupels will spit, and project portions of the metal out on the

floor of the muffle. They are best placed top-to-turvy when drying. When the muffle is at a cherry-red, and no hotter, they can be turned right side upwards, and the buttons introduced one by one. Close the door of the muffle to start the button, or make them uncover occasionally; by they will not uncover for some time. In this case a piece of thick brown paper placed on the top, or a piece of burning paper, will be generally sufficient to start them.

When they are well started, open the door of the muffle and allow the cupelation to proceed at as low a temperature as possible. When the button has well started, place the door and give a good strong heat for a minute or two to disengage the last traces of lead from the button. Take hold of the cupel with the tongs and draw to the mouth of the muffle, and allow the lead to cool gradually. If it is a good-sized bead, and the cupel is taken too suddenly from the muffle, the silver cools more quickly on the surface, and, contracting on the outside, squeezes the liquid metal inside, which forces a way out for itself. When this happens, the bead is said to "vegetate." Supposing that the bead has cooled satisfactorily, take hold of it with a pair of close pinners, and examine it. If it is round, bright, and white above, crystalline below, and easily detached from the cupel, the assay may be considered to have passed accurately. It is now to be strongly squeezed with the fingers, which will have the effect of detaching all particles of the cupel which would otherwise adhere to it. A cupel ought to be 30 or 40 grains heavier than the button to be assayed. The button does not represent the actual amount of silver in the ore, as a loss, greater than that in the large way, invariably occurs in cupellation. This loss arises principally from volatilization and absorption into the cupel. The first may be partially prevented by taking care not to cupel at too high a temperature than is absolutely necessary; and the second by attending to the quality and texture of the cupels. These losses, however, if the operation is carefully conducted, are not counted in commercial assays.

By the color of the cupel after the operation is finished we may judge of the foreign metals contained in the mineral. Lead gives the cupel a sulphur color; copper, a dirty-brown shade; bismuth, an orange-sulphur. Tin and iron give a black and grey slag, which stands like a ring round the edge of the cupel. Zinc leaves a thick sulphur circle, and gives off dense white fumes, and occasionally spits and bubbles. Antimony very frequently cracks the cupel; in this case, as before stated, the button must be scorified with rather more than half its amount of lead, and then cupelled.

ALLOY OF SILVER AND COPPER.

The determination of this alloy is estimated by cupellation. The chief point is, as in the case of regulus and rich copper ore, to have sufficient lead to pass the copper into the cupel. In case we are uncertain of the quantity of copper in it, we are sure of succeeding by using from twelve to fifteen times of lead, which is the quantity required to pass pure silver. For the assay of standard silver-copper, for instance, about six times the amount of lead does very well; but it is always better to add a little more, and make sure. An alloy of $\frac{1}{10}$ silver requires about eight times the amount of lead; $\frac{1}{20}$ of silver, about twelve times; and, after that, about fourteen or fifteen times the amount up to fair copper. It is best to make a rough assay first of all, if the standard of alloy is not known, by cupelling 5 grains of the alloy with about 30 grains of pure test lead, and noting the amount of weight in the resulting button.

The actual assay can be made as follows:—
Weigh off twelve grains of the alloy on the most delicate balance that is at hand; then passing off all the copper, and place part of it (the lead) in a cupel in the furnace, with all the precautions already pointed out. When the lead is well fused, wrap up the piece of the lead, and drop it in the molten metal. Cupel as usual, and reserve for weighing. Now weigh off twelve grains of silver that is standard.

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Finger Rings.

Rings made from the chains of criminals and iron taken from a gallows were once in great repute for curing divers cases. In Devonshire, rings were made of three nails or screws that had been used to fasten a coffin, or had been dug out of a churchyard. Lead mixed with quicksilver was used as a preservative against leucæmia. Rings were sometimes made to enclose a herb famed for healing virtues which was cut at certain times; and Josephine relates that a man drew devils out of those possessed by putting a ring, containing a root mentioned by Solomon, to the nostrils of the demoniac.

Most precious stones were formerly supposed to be endowed with medicinal properties and virtues and among them Jasper took the lead in value, Galen himself vouching for its admirable qualities from his own ample experience. It cured fevers and dropsies, stopped hemorrhages, baffled the effects of witchcraft, and promoted parturition. Emerald Jasper was pre-eminent in these qualities, and, moreover, insured chastity and continence to the wearer, on account ecclesiastics wore emerald rings.

In T. Catwode's "Caltha Potestum; or, the Bumble Bee" (1599) is the following reference to this quality:—

"So tie a necklace underneath her chin
Of Jasper, diamond, and of topaze;
And with an emerald hang she on a ring
That keeps just reckoning of our chastite.

And therefore, ladies, it behooves you well
To Jasper fall warily, when stones will tell."

A Jasper ring, with a rustic inscription translated as

"Rise as from dust we pray to thee;
From peccidæus art set us free,
Although the grave unwilling be."

was exhibited before the Society of Antiquaries in 1824. The runes used for magical and supernatural purposes are known by the general appellation of "Runes," that is strong or bitter runes, and in a learned paper by Francis Douce ("Archæologia," vol. xxi.), they are classed as follows:—

- 1 Malruens used in considering and revealing enigmas.
- 2 Sigruens gave victory in all controversies to those who used them.
- 3 Linnruens, when marked on the bark or leaves of trees that inclined to the south, cured diseases.
- 4 Brunruens, or fountain runes, used to insure safety at sea to men and property.
- 5 Hing or hognruens were runes of the mind, and made their user excel all his companions in mental vigor.
- 6 Blagruens used to protect living in women.
- 7 Swarunruens used in practicing the black art.
- 8 Willunruens or devilish letters.
- 9 Klappunruens were not written, but made by muting.
- 10 Trollunruens or devil letters were used for divination or enchantment.
- 11 Arman or almanes destroyed the ailments or decrees of strange women.

The turquoise or Turkish stone was supposed to have many and various good qualities that made it second only to jasper in popular estimation. Snylck's ring that he would not have lost 'for a wilderness of monkeys' was a turquoise. This stone was believed to strengthen the sight and spirits of the wearer, to take away all enmity, and reconcile man and wife, and to move when any peril was about to fall upon the wearer. This last quality is alluded to in Ben Jonson's "Sejanus"—

"And true as turkische in the dear Lord's ring.
Look well or ill with him."

Also and by Dr. Donne—

"A compassionate turquoise that doth tell
By looking pale the wearer is not well."

However, the most wonderful virtue of all was that it protected its wearer from injury from falls, so that however serious the danger the stone only broke, and the wearer escaped unhurt. Anselmus de Boot or Boethius, in his work on "Precious Stones" (1609), gives a circumstantial account of his own escapes from falls due to his wearing a turquoise ring.

The toadstone, also known as crapaudine and batrachites, was considered in old times as an amulet of the greatest power.

It was a sovereign remedy for many disorders, and was sometimes lent to the sick, but only on a bond for its safe return, in which its value was rated at a very large amount. Joana Baillie writing to Sir Walter Scott in 1819, tells him of a toad stone ring which was repeatedly borrowed from her old nurse, and presented to her own children and their mothers from the power of the fairies. In Ben Jonson's Fox's (Act 2, scene 3), a ring of this kind is referred to:—

"Or were you enamour'd on his copper rings,
His saffron jewel, with toadstone set."

The toadstone was set open in a ring so that it should touch the finger, as one of its chief virtues was to burn the skin at the very presence of poison. It was of old supposed to be found in the heads of old toads, a belief which Shakespeare refers to in one of his most admired passages—

"Sweet are the uses of adversity,
Which, like the toad, ugly and venomous,
Wears yet a precious jewel in his back."

The credulous Lupton gives directions how to obtain the stone. He says an overgrown toad must be put into an earthen pot and placed in an ant's hillock, when the ants will eat up the toad, and the stone will be left in the . . . This he adds, "has often been proved." To know whether a toadstone is true or not, Lupton says you must hold it before a hot fire, and he may see it. If it be good the toad will leap towards it, and make as though he would snatch it from you, 'for he envieth so much, that a man should have that stone.' These were the chief favorites of our ancestors, but many other stones and gems were highly prized for their qualities besides these three; the agate rendered athletes invincible, cured the sick, and enabled its wearer to gain the love of all women. Amber was good against poison, and it is still prized for its electrical qualities, qualities which take their name from it. Amethyst was an antidote against drunkenness, and if the sun or moon was engraven upon it, it was a charm against witchcraft. Blood-stone checked bleeding at the nose, if the words "anguis natus in te" were repeated 40 times on the same day. According to Monardes, a Spanish physician of the sixteenth century, the Indians of New Spain valued it for this property. Carolumanus, a physician, and Martinus, in "Tissæ Andronicæ," when he falls into a dark pit, discovers the body of Bassanius by the light of the jewel on the dead man's hand.

'Upon his bloody finger he doth wear
A precious ring, that lightens all the hole,
Which like a taper in some monument
Doth shine upon the dead man's early cheeks,
And shows the ragged entrails of this pit:
No pale did shine the moon on Pyramus,
When he by sight by bailed in maiden blood.'

Coral hindered the delusions of the devil. Crystal clouded if evil was about to happen to the wearer, and it was formerly much used by fortune tellers. Diamond was an antidote against all poisons. Opal sharpened the sight of its possessor, and clouded the eyes of those who stood about him. Ruby changed its color if any calamity was about to happen to the wearer of it. Wolfgang Gabelow relates the following instance of this property:—

"On December 5, 1609, as I was travelling from Stuttgart to Calais, in company with my beloved sister Catharina, and a young lady, I observed most distinctly during the journey that a very fine ruby, her gift, which I wore set in a ring upon my finger, had lost once or twice its splendid color, and had passed into obscurity in place of splendor, and darkness in the place of light, the whiteness and darkness lasted not for one or two days only, but several; so that being above measure alarmed, I took the ring off my finger and looked it up in my trunk. Wherefore I repeated, I warned my sister that some great misfortune was impending over either her or myself, as I had inferred from the change of color in my ruby. Her was I decided in my foreboding, inasmuch as within a few days she was taken with a mortal sickness that never left her till her death. After her decease, indeed, its former brilliant color again returned spontaneously to my ruby."

Sapphire possessed the same virtue as the bloodstone of checking bleeding at the nose. Topaz cured and prevented lunacy, increased riches, assuaged anger and sorrow, and averted sudden death. When such blessings as these were supposed to fall to the lot of the possessor of one

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of these precious stones, who can be surprised at the value set upon them? The old Greek poem on "Gems," which goes by the name of Orpheus, contains a full account of the magical qualities of stones, and the ring mentioned in the following passage from "Sir Perceval of Galles" (Thornton Romances) must have been set with one of the jewels we have enumerated above—

"Such a vertue e- in the stane,
To alle this world wote I name
Such stone in a ringe;
A man that be in it were [war]
Oure his body for to bere,
Ther shold no dymys lynne dre
He to de the ringe."

Other things besides precious stones were of old supposed to possess curative virtues; thus a ring made from the hoof of an elk to protect the wearer from epilepsy, and Michaelis, a physician at Leipzig, pretended to cure all diseases with a ring made of the tooth of a sea-horse. Sir Christopher Hatton sent a ring to Queen Elizabeth to protect her from all infectious airs, but to be placed in her bosom—"the chastest nest of pure constancy."

To be continued.

Engraved Gems.

HISTORY OF THE GLYPHIC ART.

By C. W. KING.

Gaithers.

But if from Greece we turn to Asia, signs appear as far back as historic records extend, holding a highly important place in the usages of the most antique amongst civilized nations, the Assyrians and the Egyptians. We find the signet of Judah the Syrian, pledges as a security from a promised payment; that of King Pharaoh, given to Joseph as a badge of his investiture with vicarious authority; the treasure chamber of Ithaminius, secured by the signet of his seal (Herod, ii, 121); the temple of Belus sealed up with the signet of Darius; the stone closing in the den of Joseph; the signet of the prisoner Daniel sealed "with the signet of the same king, and with the signet of his nobles," &c. All these circumstances declare that the practice of securing property had been known in the East from time immemorial; in fact, was almost coeval with the very institution of the right of property. For it must be remembered that in both these centres of primal civilization, the plastic clay of the two parent rivers, the Tigris and the Nile, supplied the inhabitants with the material for, almost, all their requirements; their houses, store-vessels, memorandum-books, historical monuments, and, lastly, their coffins.

The idea, therefore, must naturally have suggested itself to the first individual who deposited his property in a closed vessel, that it might be protected against pilferers by a plaster of clay laid round the junction of the lid, and rolled flat with the joint of a reed. Hence the first origin of the perforated cylinder, of which the bit of reed was the true prototype, both as to its form and its mode of application, and way of carriage. Something analogous to this is to be met with in the Grecian vase, and as late as the times of Aristophanes, we make Euripides recommend to suspicious husbands similar nature signs (around the stem of wood?) as a security against all forgery, to which the more elaborate productions of the gem-engraver were thus so much exposed. From the natural markings upon the red-joint, or the fantastically perforated wood, employed to impress the clay, the transition was easy to some definite device scratched around the circumference of the form by the owner and appropriated to himself as his own peculiar mark. This instinct of possession extending itself to the assumption of exclusive ownership in certain configurations of lines, or rude delineations of natural objects, is an universal impulse of man's nature, and is found existing amongst all savage nations when first discovered, whereover the faintest traces of social life and polity have begun to develop themselves. The red-joint has been beside the mark of his tribe, that of the individual (his *totem*) wherewith to identify his own property or the game he may kill. The South Sea Islander carries the

tattooed pattern (*umoo*) that distinguishes his particular family imprinted in his skin, and also draws the same upon his credentials, like a regular coat of arms.

These simple signs, with their artistic carvings, preceded by a long space the invention of hieroglyphics, or any other arbitrary mode of denoting ideas; for the earlier Assyrian cylinders present nothing but rude human and animal figures, or else religious symbols engraved upon them, and never exhibit the uniform legends that so commonly illustrate the designs upon those belonging to a more advanced stage of civilization. And yet even if this later date is anterior by several generations to the first appearance of any thing like an engraved gem amongst the nations of Egypt. Again if we look towards Egypt, the incredible abundance of *amulets*, formed of terra-cotta glazed, or of a soft stone, of the same period with the primitive cylinders, still remaining above ground (and how small a title those of the millions buried!) strikingly demonstrate the long established use, and the great importance of the purposes for which they were there employed. And this was amongst the inhabitants of the land that ever boasted itself the true fountain-head of all ancient civilization. In fact, the vast quantities in which scarabs must have been manufactured during the entire continuance of Egyptian independence, has been sagaciously accounted for by a theory founded upon an expression of Plato's in his "Eryxias," "in Ethiopia they use engraved stones instead of money," that they passed amongst the natives as representative of fixed values, in lieu of small change (larger sums being paid in rings of gold and silver) like the carthen and leather tokens of early Rome, recorded by Suidas or the courtesies of our own time amongst the natives of Hindostan. And speaking of the latter, by a singular coincidence, the same practice is still maintained in *china* at our potteries for exportation thither, it having been discovered that the artificial shell can be supplied in sufficient quantities more cheaply than the natural one; another point of analogy to the use above suggested as the real object of the terra-cotta scarabs.

Thus far, however, we have come upon no traces, in these earliest of signets, of the true process of gem-engraving, for all the designs they bear have been incised by means of some cutting instrument, whether flint or bronze, capable of operating upon a comparatively soft material. Herodotus describes the Elixirian contingent, in the last Xerxes, as equipped with reed arrows tipped with the stone, sharpened to a point, "by means of which they engrave their seals." Arrows, flint-headed, found in the mummy-pits certify us of what kind the stone was. The first Assyrian cylinders were made of *serpentine*, green or red; a material recommended by its pleasing color, susceptibility of fine polish, and facility of carving; the first Egyptian scarabs were in steatohite, a cognate material, and prized for the same qualities, or else in glazed terra-cotta.

The actual invention of the true art of gem-engraving (the incising a gem by means of a diamond or of the powder of a harder mineral) is undoubtedly due to the seal-cutters of Nineveh, and that at a date shortly preceding the times of Sargon; that is as early as the year B.C. 722. This is the era at which cylinders begin to make their appearance in the so-called "old" monuments that (better termed by the French *Pierres Finies*)—onyx, agate, calcadony, crystal—covered with engravings executed in precisely the same style with the archaic Greek intagli, and marked by the same minuteness of detail and elaborateness of finish. The delicate execution of the best engravings referable to this period is attested by the fact that the ancients invented the use of the *diamond point* applied in the manner described by Pliney: "These minute splinters (of the crushed diamond) gem-engravers greatly value, and mount them in an iron tool; there being nothing so hard that they will not hollow out with facility. And the same instrument is also referred to in the most venerable of all historical records: "The sin of Israel is written with a pen of iron, and with the point of a diamond; it is graven on the table of their hearts."

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The Goldsmith's Art.

FROM THE EARLIEST TIMES.

Continued.

But no one who has seen his bust of Cosimo I. and his Person, both in Florence, can assent to this severe judgment. He may make too much of the difficulties he encountered; but that we must pardon in consideration of his admirable story-telling, his autobiography being so delightful a book and conveying so vivid a picture of his times. His author later produced, in his treatise on the goldsmith's art, what we may describe a little, since it throws considerable light on the requirements of the artist. Chapter I. treats of the nature of precious stones and of the foils to be used with them. Chapter II. of nicolo and the processes employed in its use. Chapter III. relates to filigree-work, a method of producing fine open design in silver. Chapter IV. is on enamelling. Chapter V. gold-work, embossing and chasing the plates of metal, forming out of them the ornaments and statuettes to be employed in the composition of jewelry. Minute chiselling seems to have been his delight; nothing, he says, is to be cast or stamped. The jewel most in fashion at this time was a medallion or pendant, called by the French *œuvre en*, worn in the hair, such as we invariably see in the contemporary portraits. Chapter VI. describes the art of engraving in intaglio, both on metals and stones for seals. The next four chapters are occupied with coins and medals: XI. XII. relate to melting and casting, and the processes employed in constructing vessels; and XIII. to the working of statues the size of life and even of colossal proportions. The remainder of the book is occupied more exclusively with technical matters.

The names of illustrious goldsmiths during the following century are numerous; but it is of little use now to distinguish men whose productions are nowhere to be seen, or are entirely unknown. On those of France Cellini pronounces an eulogium, which proves that at the time he visited Paris, 1540, they had entirely abandoned Gothic design, and that the classic tendency of the Renaissance was as fully established there as in Italy. Perhaps the most skillful man in ornament in Paris living about this time was Francois Briot, an artist of whom little is known, and whose productions are only in pewter.

The principal article of furniture of the dining-room of the citizen as well as of the prince was the dresser, or side-board, on which all the plate was placed for show. The cost of the precious metals preventing this display in any but the homes of princes, Briot and others set themselves to devise a cheaper splendor by fabricating artistically in pewter. The material was easily worked, the danger of destruction less; and the French taste, as much admiration as similar works in more precious materials, exhibiting, as they did, elegant designs, chaste form in figures, and cautious lines in relief. They are considered by French collectors the most excellent specimens of the workmanship of the sixteenth century.

The subsequent history of design in metals down to our own may be shortly disposed of. In the early half of the seveneenth century French taste took the place of Italian throughout Europe in the lighter matters of decoration; and at the end of that age, Watteau in painting, and Louis Quatorze, or rather his upholsters, in decoration, were considered the highest made art fit for ladies and gentlemen perfect in the politeness of the court. The quasi-learned character of the Renaissance degenerated into an unlearned and mechanical pretentiousness. The gold and silver plate of Louis XIV. was ostentatious in size and weight: Lebrun was employed to design it, and Ballein to execute it. The king had seven or eight masters in the art living in the Louvre and working there. Their works have been much praised, but are all gone. In the war at the end of the century, every kind of expedient was resorted to to raise funds; the nobility were ordered to bring all their heavy plate to the mint, and Louis showed them

the example by throwing into the melting-pot all the tables and seats of massive silver, candlesticks, statues, bas-reliefs, the work of Lebrun, Ballein, and others. They had cost twelve millions of francs, and were coined into three millions.

From this time there is little new to remark. No amount of mere ingenuity, no labor, nor weight of precious metal, can make a commonplace luxury into a work of art, nor give it the same importance that belongs to a historical monument however rude; and such are the only characteristics that distinguish the more remarkable modern works. The father of Frederick the Great put his extra revenue into the shape of solid chandeliers and other furniture, with a clear intention of converting them, as need might be, into coin again. The last King of Holland, his contemporary, had a representation of the Indian court of Aurangzeb, made by Dinglinger, a multitudinous array of silver statuettes, costing 58,484 crowns. In the spirit, but in better taste perhaps, was the plateau 30 feet in length by 24 wide, presented to the Duke of Wellington by the Prince Regent of Portugal, decorated with emblematic figures in the centre and round the margin, holding wreaths and candlesticks, which covered the dining table at the annual banquet at Apsley House, according to Mr. Salter's picture, and which is said to be worth 10,000 l. metal. Better than this, however, are the shield presented to him by the city of London designed by Stothard and the city by Vechie, presented by the King of Prussia on the baptism of the Prince of Wales.

Like every other ornamentist, the silver-smith now endeavors to reproduce forms and decorations of former styles, nor is it easy to see how this imitative state of things is to be remedied, except by an intelligent appeal to nature. The historic subjects now chosen in place of cups at our races and on other public occasions afford improved opportunities for figure design, were they not treated so florid a manner; in finish and delicacy of modelling they are perfect.

Bronzes Incrustes.

This is the name given to a new style of bronze or copper work ornamented with gold and silver, by the following operation: After the object, which may be of massive copper or bronze, has received the desired form, the drawings are made with water colors, the body of which is white lead. If several pieces are to have the same design, it may be printed on in porcelain and fignee painting. Those portions of the surface not painted are covered with varnish. The article is then placed in dilute nitric acid, where the paint is dissolved off and the surface of the metal is etched to a certain depth. When the etching is finished, the article is washed with water and immediately placed in a silver or gold bath, and a layer of the precious metal deposited by electroplating. When the latter operation is finished, the varnish is perfectly removed and the whole surface ground or polished so that the ornament, the portion just given with the remainder of the surface. The contours are quite sharp. The surface is then bronzed, which does not change the color of the gold or silver. A specially fine effect is obtained by producing a black bronze of sulphuret of copper on portions of the surface between the silver ornaments. A copper vessel, then, has three colors, black and white drawings on a red brown ground of sub-oxide of copper. This new process for ornamenting metals has been devised at Christofle's works since the Paris Exposition of 1867. Specimens exhibited at Vienna in 1873 show the high degree of perfection to which it has already been brought. Unfortunately these goods are so expensive as to be only accessible to the few, although much cheaper than those in which the engraving is done by hand, and the gold or silver inserted by mechanical means. The production of an incrustation requires a high degree of manual skill and patience, but no costly machinery.

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of whale oil and tallow candles, we have received several communication on this subject and desire to say, right here, that patent gas burners and portable stands may do very well as a means to beguile the human soul, but for purposes of practical economy, they won't amount to shucks until gas companies get religion.

The Express Companies are moving to effect the repeal of that portion of the postal law which permits the transmission of parcels, weighing under four pounds, through the mails. It is natural that these companies should have an eye to their interest; but, is it not equally that the people should also look out for their interests. There is hardly a portion of our country, however remote; scarcely a village or frontier settlement, however insignificant, but have been convenience and benefited by the practical working of the law which the express companies are striving to have repealed.

The Aldermen have adopted an ordinance compelling pawnbrokers to procure license from the Mayor, and to give a bond of \$500 to do whatever the Common Council may direct. The ordinance forbids the brokers from charging more than 25 per cent. a year on loans of less than \$25 or more than 10 per cent. on loans of more than that sum, and from buying any article offered as a pledge. It also directs that no pledge shall be sold until it has been in the possession of the broker a year, and that the sale shall be by public auction, of which six days' notice shall be published in one or more newspapers.

It is very clear we think to the thoughtful observer that the yawfaring man is not sitting down on the coal-hole covers on Maiden Lane and John street so much as he formerly was. There was a time last Winter when the average man, and sometimes even mechanics and serious persons, could hardly resist the temptation to sit down on them. There was a strange infatuation about them. People straddled them, and in the most abrupt manner sat down as though they had been looking for several blocks for a good place to sit down and draw a cigar. The value of real estate saw that this sort of thing was wearing out the sidewalk and went to work to stop it. So last fall they bored holes in the covers and struck them with iron pegs. Scarcely anybody sits down on them now. Evidently goes around them. It is a very remarkable invention.

The committee charged with selecting the vase for the Bryant testimonial have chosen the design prepared by Mr. J. H. Whitehouse, of the house of Tiffany & Co. The vase is of solid oxidized silver, twenty-five inches high. Mr. Bryant's head is on one side of the vase, and medallions with bas-reliefs, illustrating various points in his life and works, are placed at regular intervals around the bowl. Four scenes are represented. In the first, his father is instructing him in verification; the second shows the poet in the woods; the third represents him as a journalist, and the fourth as a translator of Homer's *Odyssey*. The lower part of the bowl is ornamented with the two great products of America, cotton and maize.

The extensive manufacturing establishment of Messrs. Simpson, Hall, Miller & Co. is a chief feature of the town of Wallingford, Ct., on the N. Y., N. H. & Hartford R.R., twelve miles north of New Haven, which contains about four thousand inhabitants and is acknowledged one of the most beautiful of New England villages. These works do the chief business of the place, being among the oldest and the largest in this country. Their plant of machinery, we learn, would be under-estimated at a hundred thousand dollars, and embraces all that is now known to the business and of most perfect make. Every sort of article in silver plate, for table or ornamental use, is here made, in the most approved style, and from original designs of the house, and hence the goods are shipped to all parts of the world. The many workmen employed and the general look of activity of the place speak well for this house, whose New York salesrooms are at 676 Broadway.

Trade Cossip.

A reliable clock is good for all time. Mark & Schwartz's jewelry store, No. 473 3rd Avenue, was robbed on the morning of the 17th ult., of \$773 worth of rings and chains.

The imperfections of the diamond, and in fact of all gems, are made visible by putting them into a globe, when the slightest flaw will be seen to be a source of irritation. The trade is cautioned to beware of imitation.

An Eastern jeweler has recently sold a diamond necklace, valued at \$50,000, to a silver mine from Montana. The centre stone of this ornament was about the size of a small nutmeg. If things go on in this way they will wear regal crowns on rainy days in Montana yet.

A story is going the rounds that the First Napoleon always carried with him an emerald of great value. This is indeed the first intimation the world has ever had that there was anything green about the Little Corporal.

The Khedive of Egypt was so civil to the English transatlantic party in his dominions that they propose to make him a present of a valuable clock, made in their observatory. This is a new and probably a striking manifestation of the old fact that time rewards good manners.

A jewelry firm at Lancaster, Pa., has just come into possession of a silver medal presented by President Madison to the chief of a Western Indian tribe. On one side is a likeness of President Madison, and on the other of a United States officer clasp the hand of an Indian, with the motto "Peace and friendship."

The will of an old man, who died recently in Brussels, tells how he once found a valuable emerald in Asia, which he concealed in a cut in the calf of his leg, where he had made an intentional wound. The apparent intention proved his release from the mine, and he was made immensely rich by the sale of the gem, which is now one of Russia's crown diamonds.

There are an unusually large number of buildings to let on Broadway, many of which have been vacant for years, the owners preferring to have them untenanted rather than lower the rent. Between Chamber Street and Fourteenth Street there are 20 buildings containing flats to let, and 25 in which there are no tenants. There are 21 entire buildings to lease, nine of which have just been erected, and 30 stores for which tenants are wanted.

They have a thoroughly disgusted bargainer in Chicago. He has been in the habit of rifling the jewelry and other boxes of numerous stores, and thus far he has succeeded in acting with perfect impunity. It seems that he considers himself a much injured man, for he writes to the papers to say that in most instances he has returned the goods, and has sold the jewelry, pinheads, watches, ornaments and the like, and that the people are suffering thereby. His valuable jewelry never amounted to any more valuable than a Cape May diamond, unless it was a Calumet pellet.

An automaton of wonderfully clever construction is on exhibition in London, and is exciting more wonder than did Baron Kempfer's famous chess-player. In this instance the concealment of a dwarf, or a leg-man, inside the apparatus, is shown to be impossible. The figure, which is a mass of wheels and springs, plays whist with skill, and figures out simple arithmetical problems. It is placed on a table with a glass top, so that it seems to be totally disconnected with whatever agency controls its intelligent movements. Its owner is amassing a fortune by exhibiting it, and men of considerable scientific repute are trying thus far in vain, to discover the trickery.

A strange clock is said to have been brought to a Hindu Prince. In front of the clock's disk was a going swing upon poles, and near it was a pile of artificial human skin. The pile was made up of the same number of parts necessary to constitute a human body, but all were heaped together in apparent confusion. When the hands of the clock indicate the hour of one, the pile of skin rose just the number of inches needed to form the frame of one man, parting out in just the right proportions. Then the figure sprang up, seized a mallet, and, working up to the clock, struck one blow. This done, he returned to the pile and fell to pieces again. When two o'clock came, two men arose and did likewise, and at the hour of noon and midnight the entire heap sprang up, and, marching to the clock, struck one, after the other, his blow, making twelve in all, and returning fell to pieces as before.

The following table is interesting as indicating the respective value of different metals. The first eight mentioned are so rare that they are sold in minute quantities, and that they are assigned proportionate rates for the sake of comparison with others. It will be seen that the extremes, "worth its weight of gold," is by no means superfluous.

VALUABLE MINERAL SUBSTANCES.		
Indium.....	\$2,500 00	Silver..... \$18 85
Vanadium.....	\$2,000 00	Cobalt..... 7 75
Ruthenium.....	\$1,400 00	Cadmium..... 5 50
Rhodium.....	700 00	Nickel..... 4 40
Palladium.....	500 00	Antimony..... 3 30
Uranium.....	576 38	Bismuth..... 2 20
Osmium.....	325 28	Tin..... 1 25
Platinum.....	191 45	Manganese..... 1 10
Gold.....	147 30	Iron..... 35
Thallium.....	108 72	Arzenic..... 13
Chromium.....	48 00	Zinc..... 11
Magnesium.....	36 00	Lead..... 10
Potassium.....	23 00	Iron..... 09

SHEPARD, LE BOUTILLIER & CO.

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MUSICAL



BOXES CLOCKS, BRONZES & FANCY GOODS, 10 Maiden Lane, N. Y.

We desire to call the attention of the Trade to our recent Importation of MUSICAL BOXES, which have been selected with great care and special adaptation to the American taste.

We are constantly receiving invoices of the latest production of London Paris, Vienna and Berlin, to which we invite the attention of buyers.

CRYSTAL CHANDELIERS

GILT, BRONZE & DECORATED GAS FIXTURES, Fine Marble & Bronze CLOCKS,

Bronze Figures and Ornaments in Greatest Variety,
at Low Prices, Manufactured by

Mitchell, Vance & Co.

No. 597 BROADWAY NEW YORK.

"Medal of Special Award" by American Institute, 1872,
No. 719, GAS FIXTURES.

MITCHELL, VANCE & CO., 327 Broadway, N. Y.
We find the above-mentioned PICTURE and Glass Chandeliers, for design, excellence of workmanship and finish in all their parts, to be the best production in the country and we may say, in no country excepted, by all the MEDALS in the WORLD.

We recommend A MEDAL OF SPECIAL AWARD for CHANDELIERS and GAS FIXTURES.
(Signed) JOHN W. CHAMBERS, Secretary.

"Medal of Special Award confirmed."

C. F. A. HINRICHS,

20, 31 and 33 PARK PLACE,

Cor. of CHURCH STREET, (Upstairs) NEW YORK.

Successor to M. WERCKMEISTER.
(ESTABLISHED 1801.)

IMPORTER AND DEALER IN FANCY GOODS,

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Sole Agents for the GLASS FACTORIES of the COMPANY "ANN," Namur, Belgium.

Dept. for ARCHERY, CRICKET and BASE BALL IMPLEMENTS
And for C. A. KLEEMANN'S CELEBRATED GERMAN STUDY LAMPS.

Price Lists sent on application. Goods imported to order.

FINE 18 KARAT WATCH CASES,

Manufactured by ROBBINS & APPLETON,
For American Waltham Watches,
No. 1 BOND STREET, NEW YORK.



200



542

Prompt and careful attention given to SPECIAL DESIGNS for
PRESENTATION PURPOSES.



193



564



537



197



194



The above is a fac-simile of our certificate, which ac-
companies every 18 karat Case of our manufacture, and is
as valid a guarantee as the stamp of the Philadelphia Mint.



199



190



568



186

The above engravings are a few examples of Decorated work executed by us from original designs. The number under each cut corresponds with those registered in our book of designs, and can be referred to when ordering.
We are prepared to execute orders for cases in any quality of gold, embracing an unlimited variety of designs, unexcelled for beauty, originality and superior workmanship.

The Fitch Diamonds.

We present herewith, by the courtesy of Mr. Frank Leslie, and from his *Lady's Journal*, a fine cut of the necklace of diamonds presented to Gen. Sherman's daughter, now Mrs. Fitch, by the Khedive of Egypt. The estimates of the value of these jewels have been exaggerations beyond all precedent, and \$40,000 really represents the most liberal valuation that can be put upon them. The number and size of the diamonds is so counterbalanced by their off color. The following letter which we clip from the Washington Capital, by the famous "Parson merchant," who was once a diamond merchant, describes the necklace minutely and gives the true facts:

Mr. Kirtland—I was just debating whether I should assume myself first, and peradventure your readers after, to gossip on the great Brooklyn scandal; or whether I should assume your readers first, and myself after, by describing the diamond necklace sent by the Khedive of Egypt as a wedding present to the fortunate daughter of gallant General Sherman.

pair of long pear-shaped diamonds set with small diamonds round.

This is no near the description as can be given. The mounting is very heavy, and will prove quite a load to carry round the neck by a delicate lady.

There is an immense quantity of diamonds in the necklace, such as they are. I should say, if my Parson eye does not deceive me, there must be three hundred carats of diamonds in this necklace and earrings, which is about two ounces' weight of diamond without the setting.

This present, although very nice and very liberal, must nevertheless yield to the mild criticism as to the quality of the diamonds. Candor compels me to say they are not white. They are very nice stones, and will at night, by gaslight, look brilliant enough. But of course two ounces of goldencolor or pure Brazilians of that size are not now so easily picked up. Nevertheless, the quality will make up for the quality. The necklace has caused the French presentation taste, shewn in the extreme and profuse to destruction.

The fabulous value put on this necklace and earrings is perfectly amusing, and I shall decline

neary, and some quite, as fine as the Brazilian diamonds; and I have myself seen white diamonds from Africa that are superior to the fine Brazilian diamonds.

The English and American *faux* idea of a diamond necklace is the never-out-of-fashion *lancet*—that is, a single row of fine white brilliants, a centerpiece, tapering off on both sides. There are several very valuable necklaces of that kind even in New York, some as high as \$20,000 or \$30,000, and yet there are not more than twenty-six or thirty single stones in the whole necklace.

The African diamond discovery has revolutionized the whole diamond trade, and no one now can value a diamond by the good old multiplication rule.

In 1750 one Jeffries made a diamond table, which is the simplest in the world to value large stones. Thus, to use his table, the value of the Kohinoor could easily be ascertained. The rule is to multiply the stone by its own weight and put a value of so much per carat.

For instance, if a fine white brilliant, weighing one carat, is worth \$100, what is the Kohinoor

day by asking four of the foremost diamond importers and dealers in New York to give me an idea of the importation as to value, at least what they supposed the American market absorbs annually, and here is the result. I give the initials, each of whom represents a real jewel:

S. estimated	\$10,000,000
H. " "	15,000,000
R. " "	8,000,000
R. " "	10,000,000

Which gives an average of \$10,000,000. Then, then, it seems that the Treasury is only able to collect about a fifth of the duty. Hence, knowing this year ago, I maintain that a great country should forgo \$200,000 revenue, if only to purify the consciences and the false swearing of so many of its citizens.

It is besides unjust to the importer who does pay honestly. The error of the chieftain-duty is so great that such people are no doubt in this country.

Now, again, the importation of diamonds does not impoverish a country. Country, it enriches it. Let me exemplify. Mrs. A. is rich, can af-



THE DIAMOND NECKLACE AND EAR-RINGS

Presented by the Khedive of Egypt as a Wedding-Gift to Mrs. Lieutenant Fitch, the Daughter of General Sherman.

It was by no means so easily decided. My Oriental education whispers to me that both these luxuries—scandal and jewels—are very dear to the daughters of Eve. But the jewels triumphed simply because the diamond necklace is here, it compels, whereas the Brooklyn scandal is on trial and incomplete.

New York was quite in a flutter to hear that a diamond necklace, gossip said to be worth five lakhs of rupees, or 50,000 pounds sterling, or \$250,000, or a million and a quarter of francs, had arrived at the custom-house, destined for General Sherman's daughter, the happy Mrs. Fitch. As one of the favored few, I had a sight at this gift, and here is a description of it.

It is a double necklace set in gold, or two rows of single stones of no great size, from three carats down to one half carat; between every eighth stone a pear-shaped diamond, of large size, from ten carats to three carats each, is suspended; the centre stone is a diamond weighing some twelve to thirteen carats, and the snip is a diamond about six carats. The earrings to match are a

pair of long pear-shaped diamonds set with small diamonds round. This is no near the description as can be given. The mounting is very heavy, and will prove quite a load to carry round the neck by a delicate lady.

There is an immense quantity of diamonds in the necklace, such as they are. I should say, if my Parson eye does not deceive me, there must be three hundred carats of diamonds in this necklace and earrings, which is about two ounces' weight of diamond without the setting.

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For instance, if a fine white brilliant, weighing one carat, is worth \$100, what is the Kohinoor

kind to dress according to her station. Suppose she sends, say \$100,000 a year on her wardrobe. If she would set apart only \$1,000 annually for diamonds, she would certainly not be divided much less for \$9,000. At the end of the ten years she would have saved from her very wardrobe \$100,000, while during the eleventh year the ten years' wardrobe, costing her \$100,000, would not be worth or fresh enough to buy her a velvet robe. Mrs. diamonds should be free of duty. There is no country in the world that has a duty on loose diamonds except the United States. In India a dealer in precious stones, that is, a man who imports them and brings them to the country, is by courtesy entitled to the appreciation of Subh, a title, my dear editor, which I see freely, with the usual usual of my disposition, bestow on my friends.

Believe me, yours very sincerely,

ANNEXED CRYSTALLOLOGY,
Parson Merchant of Bombay.

Since the above was written Congress has, by joint resolution, admitted them free of duty.

DIAMONDS !

SMITH & HEDGES,

No. 1

MAIDEN LANE, corner Broadway,
NEW YORK.

SAPPHIRES !

DIAMONDS !

EMERALDS !

We are constantly receiving large importations of DIAMONDS in all grades, from medium quality to the finest.

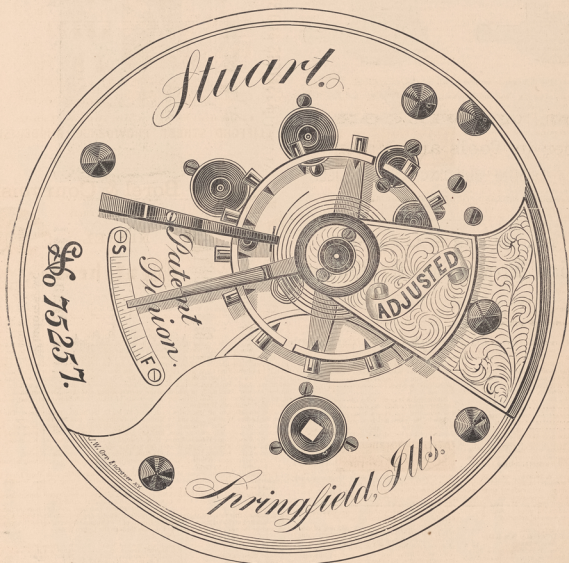
In the selection of "gems," in all sizes, our stock constantly offers great inducements to dealers, and those having customers for extra choice, and expensive large stones, either single or in match pairs, will find it to their interest to favor us with their orders, as in this respect our stock is unequalled.

A large stock of mounted work also constantly on hand.

N. B.--Orders for goods on selection will receive prompt attention.

RUBIES !

"ILLINOIS" SPRINGFIELD WATCH CO.



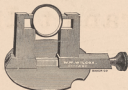
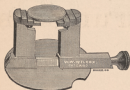
BEST GRADE MOVEMENT.

All movements made by us are **18 Size, Full Plate, and have Sunk Second Dials, Exposed Pallets, Cut Expansion Balances**, (except the "Mason," which is half-cut.) **Three Grades** are finely adjusted to temperature, and have the word "Adjusted" engraved on the balance bridge. All Balance Pivots are conical and Hair Springs finely tempered.

These goods (8 grades,) are now in stock and for sale by all the principal **Jobbers** in the United States.

Descriptive Circulars and Price Lists furnished to the Trade upon application, with business card.

Factory and Office, SPRINGFIELD, ILLINOIS,
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WILCOX'S PATENT ENGRAVERS' BLOCK.**THE BEST MADE,****Strongest and Most Useful in the Market.**

 The upper surfaces of all articles always level.

For sale by all Jobbers in Tools and Materials, or by the Proprietor and Manufacturer.

W. W. WILCOX,**Jobber in Tools and Materials,****No. 7 TRIBUNE BUILDING, CHICAGO, ILL.**

TO WHOM JOBBERS SHOULD ADDRESS ALL ORDERS.

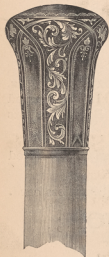
P. P. BELL'S**Chemical Preparations for Jewelers.**

These Preparations are only sold to the Trade by

CROSS & BEGUELIN, 21 Maiden Lane, N. Y.**And B. F. NORRIS & CO., 103 State Street, Chicago, Ill.**

Gold Plating without a Battery.....each, \$3 00	Rouge, large bottle.....each, \$0 50
Silver Plating without a Battery.....1 50	" small.....0 25
Vienna Lime.....0 50	Soft Solder Fluid.....0 25
Jewelry Renovator.....0 25	Nitric Acid.....0 25
Hard Solder Pickle.....0 25	Cerulean.....0 25
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 A Full Descriptive Catalogue sent free to the Trade. Send for one.

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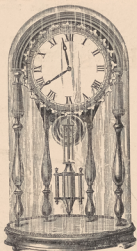
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FINE GOLD

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**SILVER HEADED
WALKING CANES,**

Office and Factory.

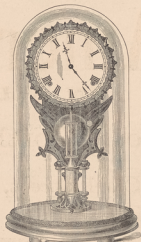
No. 18 John Street,**NEW YORK.****JAMES WOOD,**MANUFACTURER OF
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Manager of the
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SELF-ACTING TABLE FOUNTAIN

**An Attractive Ornament!****For Store Windows, &c.**

They will play from one and a half to two hours when started.

Made in three sizes. Prices \$15, \$18 and \$20, packed,

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the Clocks in Market**No. 3 Paris.**

FOR
**Churches, Factories, Stores
and other Buildings.**

No. 6 Cortlandt St., New York.

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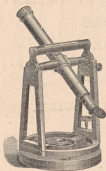
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John Bliss & Co's Transit Instruments,

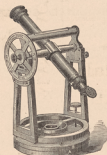
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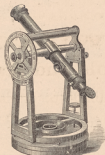
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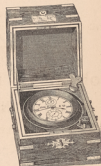
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NO. 8.



NO. 10.



Marine Chronometers.

IMPORTANT NOTICE.—These Transits are readily set in position without the aid of strictly correct time as a basis for that purpose. Printed instructions, easily understood, accompany each instrument and no calculations are required preliminary to setting in position. As a trial only is required to insure unqualified approval, we are induced to make the following **LIBERAL OFFER.**—On receipt by us of satisfactory reference, and 10 per cent. of the price, we will send one of the foregoing Transit Instruments, on hire or trial, for one month, with full printed instructions for setting up and using the same, and if purchased after trial, we will allow the whole hire to apply in part payment, and sell the instrument on approved note at four months for the balance. Special terms for payment by installments, after trial, on application. We do not make this offer merely to hire these instruments, but to insure a trial with a view to sales, the hire received being only sufficient to cover the cost of repolishing in case they are returned. Send for Illustrated Circular giving full description.

JOHN BLISS & CO., 110 Wall Street, New York.

WATERBURY CLOCK COMPANY

MANUFACTURERS AND JOBBERS OF

American Clocks

IN ALL THEIR VARIETIES.

No. 4 Cortlandt Street, New York.

No. 160 Clark Street,
CHICAGO.Nos. 31 & 33 Sutter St.
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FACTORIES, WATERBURY, CONN.

M. BAILEY, Treasurer.

Silver-Plated Ware

MANUFACTURED BY THE

MERIDEN BRITANNIA CO.

550 BROADWAY,

Factories, West Meriden, Conn. NEW YORK.

SOLE PROPRIETORS AND PATENTERS OF THE

CELEBRATED PORCELAIN LINED ICE PITCHERS,

AND

PORCELAIN LINED SILVER-PLATED

Baking and Entree Dishes Combined.

With movable linings, porcelain enameled on hard metal, cannot be broken or cracked by heat or ordinary usage; and are CLEANER, LIGHTER and MORE DURABLE than any other.

For sale by Dealers in Silver-Plated Ware,

AND BY THE

MERIDEN BRITANNIA COMPANY,

No. 550 Broadway, New York,

MANUFACTURERS OF

Superior Nickel Silver and Fine White Metal Electro-Plated

TABLE WARE

OF EVERY DESCRIPTION.

FORKS AND SPOONS.

Extra Heavily Plated by the NEW PATENT PROCESS, which deposits the silver any requisite thickness on the PARTS MOST EXPOSED TO WEAR.

THEY ARE UNRIVALLED for durability by any made by the old process.

Spoons and Forks plated by this improved method are stamped:

1847—ROGERS BROTHERS.—XII.

First Premium Awarded by the American Institute, 1873 and 1874.

Extract from Judges' Report.

"We consider the Goods made by this Company to be by far the best made in this country, and we believe in the world."

W. J. OLIVER.

ESTABLISHED 1852.

RICHARD OLIVER.

RICHARD OLIVER,

Manufacturing Jeweler and Diamond Setter,

Would respectfully inform the Trade generally that he makes to order ANY article of Jewelry that may be desired.

Special attention given to making

Odd and Intricate Jewelry and Difficult Repairs.

In his Repairing Department are men who have been especially educated for this important branch of the Jewelry business. Inlaid, Setting, Engraving, Chasing, Gilding, Coloring, Cutting and Engraving of Stones, etc., etc.

Everything pertaining to the MANUFACTURING and REPAIRING OF JEWELRY done in a thorough manner.

SATISFACTION GUARANTEED.

Knowing the many disadvantages which the majority of Retail Dealers labor under in purchasing goods, Mr. Oliver, in addition to offering goods of his own manufacture, would take this opportunity of offering to them his services in procuring any article they may need in their business. Being acquainted with all the Manufacturers and Importers of Watches and Jewelry, he feels warranted in saying that a saving of at least ten (10) per cent. can be made to all who entrust their orders to him, being also a Practical Workman he is therefore not easily deceived, and parties may rely upon receiving the right article.

"GOODS WELL BOUGHT ARE HALF SOLD."

Post Office Orders, or Draft on New York, should accompany all orders; or, if desired, will send them C. O. D.

Any information will be cheerfully given.

RICHARD OLIVER,

No. 11 JOHN STREET, NEW YORK.

SPRING TRADE 1875.

AIKIN, LAMBERT & CO.

14 & 16 Maiden Lane,

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**Choice
Gold Pens.**

Have in stock, and are manufacturing a large assortment of first-class Gold Pens, consisting of long nibs, short nibs, fine pointed, coarse pointed and angular or oblique pens. All of which will be furnished with soft, springy, or hard temper as may be required.

**Assortments
Show Cases.**

Assortments arranged in handsome trays, and pen signs furnished to regular agents. Being disposed to meet liberality with liberality we have originated and gotten up Metal Show Cases of sizes suitable to the wants of our patrons who order sufficient goods to make a creditable display. Others are compelled now to follow our lead, acknowledging us as "Leaders of Fashion."

**Rich
Jewelry.**

We are also manufacturers and dealers in solid gold and rolled plate jewelry, all of which being intended for the Jewelry Trade proper will be found reliable.

Rings.

Diamond, Amethyst, Topaz, Pearl and Stone Cameo Rings.
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Watches have been introduced for some 10 years and numbers of them have been sold. By inviting criticisms from the several master-minds in America, as well as in Europe, we have now a watch perfect in its proportions, reliable in its actions, made of the best materials, and in short, the best watch for the money offered for sale; energetic competitors will endeavor to force their goods that the Paul Breton's may be displaced, but the testimony of those who have experimented is, that for assured continued excellence the Paul Breton is the watch.

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Freres,
*Something
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of Leode, have just sent out an invoice of their movements, gotten up under our direction, with *Estel's Patent Regulator and Patent Safety Barrel*. Something entirely new.

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Watches are three quarter-plate in style and full-jeweled; have tempered hairsprings; good balances, and are Standard Watches at low prices. Will have dials, hands, springs, etc., for repairs.

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**One Ladies'
Case for Four
Different
Movements.**

We make the patent "compromise cap" to our ladies cases, by which the same case can be used for the Elgin, Waltham, Latour, or Longine movements.

Dealers visiting this city are requested to call and introduce themselves. Those desiring to write us will address

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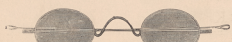
14 & 16 MAIDEN LANE.

NEW YORK.

JAMES C. AIKIN.
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Manufacturers of GOLD & SILVER

Thimbles,**Spectacles & Eye Glasses**

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For Electro-Plating Without a Battery.

The Manufacturer offers the public Gold and Silver Solutions, made from Pure Gold and Silver, by means of which plating may be done without use of a battery. They are so simple than all can use them, and at a small expense.

Price List.—Gold Solution, \$3.00; Silver solution, \$1.50.

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SUCCESSORS TO W. H. FRASSE.)

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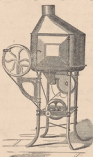
IMPORTERS OF STUBS

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TOOLS, FILES AND STEEL WIRE

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Jewelry Jewellers Forge or Assays Furnace.

No. 62 Chatham Street, New York.**Buyers' Directory.**

A Guide to the prominent Wholesale Houses in the Watch, Clock, Jewelry and kindred branches of Trade in New York.

Clock Companies.

American Clock Co.—Manufacturers of Clocks of all kinds. Salesroom, No. 581 Broadway.

Amoson Brass & Copper Co.—19 & 21 Cliff street, New York.

Cook, Benjamin J.—Wholesale Dealer in all kinds of Clocks and Regulators, No. 127 North 3d Street, Philadelphia, Pa.

Kroeber, P.—Clocks and Regulators of every description, No. 8 Courtland Street, N. Y.

United States Clock Co.—Henry Turlime & Son, 3 Courtland street, N. Y., Manufacturers of Fine Regulators and American Clocks.

Waterbury Clock Co.—M. Bailey, Treasurer, Managers and Jobbers, No. 4 Courtland Street, N. Y., No. 160 Clark Street, Arcade Building, Chicago.

Wood, James—Manufacturer, Importer and Dealer of Fine Regulators and Clocks of every description, 4 Courtland street, N. Y.

Corals and Coral Jewelry.

Erlicio Bros.—Established 1809—Importers of Coral Jewelry, 19 John street, N. Y. Manufacturer, 20 St. Catharine's Church, Naples, Italy.

Lawson & Graybe—Manufacturer Fine Gold & Coral Jewelry altered, refitted and repaired, No. 63 Nassau St., N. Y.

Cameo Cutters, Etc.

Boneti, E.—Successor to Bernard & Bonetti, Cameo Litheness, No. 269 Broadway, New York.

Chronometers.

Ellis, John & Co.—Standard Marine Chronometers, Transits for Watchmakers' Use, No. 110 Wall street, N. Y.

Diamonds.

Berthard, A. & Co.—Manufacturing Jewelers & Importers of Diamonds, Fine Jewelry, 169 Broadway, Gilbert building, N. Y.

Blossinger, E.—Importers of Diamonds, No. 182 Broadway, N. Y.

Pere, Henry—Importer of Diamonds, No. 9 Maiden Lane, N. Y.

Morsch, Jacob—Importer of Diamonds, Pearls, French & Italian Stone Cameos, Amethysts, Onyxes, and Precious Stones. Diamonds in pairs especially, No. 35 Maiden Lane, N. Y.

Nevesheimer, Z. Aug.—Importer of Fine Diamonds, No. 5 Maiden Lane, New York.

Diamonds and Diamond Jewelry.

Bornemann, Louis—Manufacturer of Diamond Jewelry. Brings a specialty: superior finish and original design. Send for Price List of Single Articles, 109 & 171 Broadway, N. Y.

Smith & Hodge—Importers of Diamonds Exclusively, and Manufacturers of Fine Diamond Jewelry, 1 Maiden Lane, cor. Broadway, N. Y.

Taylor, Chas. L. Taylor, Importers Diamonds and Diamond Jewelry, 3 Bond street, N. Y.

Diamond Setters, Etc.

Friedel, S.—Manufacturer of Fine Jewelry, and Diamond Setter, 33 John street, N. Y.

Hayden & French—Manufacturers of Fine Jewelry and Diamond Setters, No. 65 & 67 Nassau street, N. Y. N. B.—Particular attention paid to repairing in all its branches.

Enamellers, Etc.

Orr, Jas. Co.—Enameler of Fine Jewelry, Flowers, Birds, &c., Enamelled in color. Band Bracelets (a specialty), 77 Nassau Street, N. Y.

Engravers and Die Sinks.

Dobley & Wood—Engravers & Engravers of Precious Stones, 109 & 171 Broadway, Room 23, New York.

Fackner, Edward—Carver, Engraver and Chaser on Jewelry, Monograms, Lettering, &c., No. 19 John street, N. Y.

Heming, Albert J.—Die Sinker & Engraver, 217 Centre street, N. Y. Dies for Jewelers and Silversmiths, Enamelling Plates, Seals, &c.

Keepp, Charles—Engraver, Die Sinker and Designer for Jewelry, &c., 14 and 18 k. Shanks and Heads for Rings, &c., 41 Maiden L., N. Y.

Park, William—Stone Seal & Cameo Engraver, and Die Sinker. Masson's Engraving and Sealing for Incrustation, 303 Broadway, N. Y. Room 1414.

Schuler, J. David—Stone Seal Engraver, Arms, Crests, Initials and Monograms engraved on Stone Seals, &c., No. 71 Nassau Street, N. Y.

Electro Platers.

Jeanboud, F. & Son—Gold and Silver Electro Platers & Fine Golds, Colors, Engraving and Gold Jewelry specialty, 71 Nassau St., N. Y.

Jeanneau, P. A.—Gold and Silver Electro-Plater and Engraver, Colors, Engraving and Gold Jewelry Cases a specialty, 65 Nassau street, N. Y.

Normandeau, P. A.—Electro Gold & Silver Nickel Plater. Colors, Gold and Silver work a specialty, No. 103 Nassau Street, N. Y. Sole Agent of New York Nickel Plating Company. Licensed by United Nickel Company.

Nickel Plating.

Scherrer's—Nickel Plate Works. Plating on all metals by an improved solution, 42 Dey St.

Fancy Goods, Clocks, Bronzes, Etc.

Hay, Alex. M. Co.—Importers of London, Paris and Vienna Fancy Goods, Clocks, Bronzes, Musical Boxes, Diamonds, Watches, Jewelry, &c., 23 Maiden Lane, N. Y.

Hierarchie, C. P. A.—Importer and Dealer in French, English and German Fancy Goods, 25 & 27 Dey Street, N. Y.

Magnin, V. J. Goods & Co.—Importers of Clocks, Bronzes, Musical Boxes & Rich Fancy Goods etc., 62 Dey Street, N. Y.

Shepard, Le Boulleux—Co-Importers of Fancy Goods, Clocks, Bronzes, &c., No. 10 Maiden Lane, N. Y.

Gold Chains, Etc.

Bock, J. & Son, Manufacturers of Fine Gold Chains and Chain Bracelets, 10 Liberty place, near Maiden Lane, N. Y.

Pollak & Dreyfus—Manufacturers of Gold Chains with Patent Safety Swivel Attachment, No. 4 Maiden Lane, N. Y.

Kaufmann Bros.—Manufacturers of Gold Chains and Chain Bracelets, 36 John street, Factory, 5th street, N. Y.

Loeblich, Albert—Manufacturers of Fine Gold Chains. All goods warranted, No. 43 Maiden Lane, New York.

Smalls, Dorrance & Edge—Manufacturers of the Celebrated Wovey Patent Gold Chains and Chain Bracelets, 5 Maiden Lane.

Gold Pens, Etc.

Aiken, Lambert & Co.—Manufacturers of Choice Gold Pens, Cases, Holders, Touchpicks, etc., 14 & 16 Maiden Lane, N. Y.

Todd, Edward & Co.—Manufacturers of Gold Pens, Pencil Cases, Tooth Picks, &c., 603 Broadway, N. Y. Factory, Brooklyn.

Gold Rings.

Bowden, Joseph H.—Manufacturing Jeweler, Solid Gold Rings a specialty, No. 11 Maiden Lane, New York.

Ely, W. H.—Manufacturers of Solid Gold Rings of every description, No. 38 Nassau Street, New York.

Hair Jewelry.

Franchon, H. Co.—(late Charles Franchon & Co.) Minit Hair Jewelry & Device Work, Importer of Alluring and Sample books always on hand, 165 & 167 Broadway.

Miller, H.—Artist in Hair, and Jeweler, 189 Broadway, up stairs, N. Y. Established 14 years.

Jewelry Cases, Fancy Boxes, Etc.

Altenberg, C. & Co.—Manufacturers of Russian and Moscow, Jewelry and Silverware Cases, Fancy Goods, &c., 2 Bond street, N. Y.

Brown, Chas. E.—Manufacturer of Jewelry Boxes, Trays for Silver Cases, &c., 62 Chatham street, N. Y.

Dahlben, W.—Manufacturer of Cases for Jewelry and Silverware, No. 35 Nassau Street, N. Y. Show Case Trays, &c., at the shortest notice.

Jackson, Samuel C.—Manufacturer of the newest styles of Boxes and Trays for Silverware, Jewelry, Watches, &c., 169 Broadway, N. Y.

Steinle & Haasler—Manufacturer of Fancy Boxes for Jewelry and Silver Ware, 66 Nassau St. Patented of the Celebrated Adjustable Boxes.

Sturm, L.—Manufacturer and Importer of Cases for Jewelry, Watches, Silverware, &c., 15 Centre street, N. Y.

Wiggers & Froelich—Manufacturers of Fine Morocco Cases for Jewelry, Watches Silverware, Trays and Porcelain Ring Trays, &c., No. 60 Nassau Street, N. Y.

ewelry-Fine.
De la L. & Co.—Manufacturers. General line of watch and jewelry, 14 and 16 Maiden Lane, N. Y.
John, Sexton & Peterson.—Manufacturers of Fine Jewelry, No. 1 Bond Street, N. Y.
Ball & Howard.—Manufacturers of the Self-Adjusting Band Bracelet Guard, (Bracelets a Specialty), No. 10 John Street, N. Y.

Bartman & Stuart.—Manufacturers of jewelry, Seal and Stone Rings, a specialty. Orders promptly attended to. 41 Maiden Lane, N. Y.
Benton, Andrews & Co.—Manufacturers of Fine Jewelry, No. 35 Maiden Lane, N. Y.
Roman and Erasmus.—Manufacturers of Jewelry, 100 Broadway, N. Y.
Bissinger, E.—Importer of Fine Jewelry, Lockets, Cosses, Neck Chains, &c., No. 182 Broadway, New York.

Carroll, Cook & Co.—Manufacturers of Fine Gold, Enamelled and Plain Lockets, No. 191 Broadway, N. Y.
Burch, DeWolf & Coughlin.—Manufacturing Jewelers, 9 John street, N. Y.
Carter, Hawkins & Sloan.—Manufacturing Jewelers, 1 Bond Street, N. Y.
Coe, Planno & Stevens.—Manufacturers of Fine Jewelry, Lockets a specialty. Office, old No. 9 Maiden Lane, N. Y.

Dunnett Bros.—Manufacturers and Importers of the Jewelry, Cans and Oxy Lockets, Silver Buttons and Pins a specialty. Old No. 9 Maiden Lane, New York.
Fitch & Chatterton.—Successors to Merrill, Fitch & Allen—Manufacturers of Fine Jewelry, Chains, Band and Chain Bracelets, No. 19 John Street, N. Y.

French, P.—Manufacturer of 18k and Fine Stone Rings (also Diamond Work), Jobbing attended to with dispatch. No. 14 John Street, New York.
Goddard, John M.—Manufacturer Jewelry, Seal Rings and Fine Lockets a specialty, No. 25 Maiden Lane, New York.
Griffin, H.—Manufacturer of Fine Jewelry, Stud and Buttons a specialty, Jobbing attended to. N. Y. City, Adams Street, Brooklyn, N. Y.

Hartmann, P.—Manufacturer of Jewelry, Gold, Diamond and Silver Jewelry, No. 38 Maiden Lane, N. Y. P. O. Box 2, 64.
Horton & Chase.—(Successors to D. D. Horton), Manufacturing Jewelers, 100 Broadway, N. Y. Factory, Providence, (R.I.)
Kimball & Kittle.—Manufacturers of Fine Gold Jewelry, 29 Bond Street, N. Y.

Krebs, George.—Manufacturing Jewelry, 29 Bond Street, New York.
John & DeWitt.—Manufacturers of (14 and 18 karat and Roman Gold) Band Bracelets, &c., Importers of Lockets, 18 John Street, N. Y.
Leander, John D.—Manufacturing Jewelry, 100 Fulton Street, N. Y. Factory and Gold Receipts a specialty.

Miller Bros.—Manufacturers of Fine Jewelry, Locket, Stud Buttons, Rings, &c., 47 Bond Street, Maiden Lane, New York.
McCurry, Daniel E.D.—Manufacturer of Fine Enamelled Jewelry, Half Sets, Studs and Silver Buttons, 148 Fulton Street, N. Y.
Mellord, Hale.—Cottles—Manufacturers of Jewelry, Walham Building, 1 Bond Street, N. Y.

Oliver, Richard.—Manufact. Jewelry. Gold and intricate articles of Fine Jewelry made to order, repairing done for the trade, 11 John St., N. Y.
Oppie & Elsdorfer.—Manufacturers of Seal Rings, Studs and Silver Buttons, 50 Bond Street, N. Y. Orders promptly attended to.
Oskamp, Clemens.—Manufacturer of Jewelry, 175 Vine Street, Cincinnati, Ohio.

Owen, G. S. & Co.—Manufacturing Jewelers. Office, No. 9 Bond Street, N. Y.
Rosen, S. & Son.—Importers & Dealers in Jewelry, Watch Materials, Watch Glasses and Spectacles, 17 Nassau Street, New York.
Schaefer, Valentine.—(Successor to V. W. James & Co.) Manufacturer of Roman and English Jewelry, No. 35 John Street, N. Y.

Soule H. & G. Co.—Manufacturers of Fine Jewelry, Patent Self-locking Bracelets a specialty, 17 Maiden Lane, New York.
Spadoni, Rodol.—Co.—Manufacturers of Fine Jewelry, Chains, &c., Importers of Watches, &c., 65 Broadway, N. Y.
Spies & Rowzee.—Manufacturers of Fine Jewelry, Diamond Goods, &c., 9 and 11 Maiden Lane, N. Y.

Swinnerton Bros. & Co.—Manufacturers of Jet and Fine Jewelry, Office, 106 Broadway, N. Y. Factory, Newark, N. J.
Thoma, Ernest.—Manufacturer of Fine Gold Pins and Children's Earrings, 175 Broadway, N. Y. Factory, Hackensack, N. J.
Wheeler, A.—Manufacturer of Diamond and Fine Jewelry, Masonic Jewels, Badges, Emblems, &c., 25 John Street, N. Y.

Winer Brothers.—Manufacturers of Gold Chains and Fine Jewelry, 125 Fulton Street, N. Y.
Jewelry—Shell, Gift, Jet, &c.
Cohen William.—Importer of Jewelry, Fancy Goods, Whiffy Hats, Gills, Tortoise Shells, &c., &c., No. 4 Maiden Lane, N. Y.
Hitchcock, C. F. A.—Importer of Amber and Silver Jewelry, 29, 31 & 33 Park Place, N. Y.
The Thayer Manufacturing Jewelry Co.—Successors to J. B. Thayer & Co., Manufacturing Jewelry Specialty; Coldfold Jewelry, No. 229 Broadway.

Jewellers' Tools and Findings.
Diamonds & Co.—Manufacturers of Jewellers Findings, Paper Boxes, Cards, Tags, Cottons, Thread, Pins, &c., 292 Broadway, N. Y.
Prasse & Co.—Manufacturers of Jewellers' German and Sheffield Tools, File and Steel, and Jewellers' Watchmakers, Jewelers, &c., 65 Chatham street, N. Y.

Lapidaries.
Fox, M. & Co.—Practical Lapidaries and Importers of Precious Stones, Pearl, Cameos, &c., No. 131 Nassau Street, N. Y.
Kordmann & Michel.—Lapidaries, Importers of Precious Stones, Pearls, Diamonds and Jewels, 100 Broadway, N. Y.
New York Steam Lapidary Works.—T. P. More, Importer of Stones, and Manufacturer of Stones, Glass Jet Jewelry, 42 Ann St., N. Y.

Masonic and Odd Fellows' Jewels.
Levine, S. P.—Masonic and Odd Fellows' Jewels, Chains and Emblems a specialty; also Fine manufactured for all secret orders, 70 Nassau Street, N. Y.
Miller & Bro.—Jewelers, No. 63 Nassau Street, N. Y. Importers of Jewels, Masonic Emblems and Badges made to order.

Musical Boxes, Etc.
Hinrichs, C. P. A.—Importers of Musical Boxes, Gramophones and Phonographs, No. 29 and 31, 33 Park Place, N. Y.
Puilland, M. J. & Co.—Importers and Dealers in Musical Boxes, Boxes carefully repaired, 60 Broadway, N. Y.

Opticians.
Burbank, Bond & Co.—Manufacturers of Spectacles and Eye Glasses of all descriptions, in gold, silver or steel, 14 Liberty Lane, N. Y.
Kell, John.—Manufacturer of Gold Eye Glasses and Spectacles, No. 67 Nassau Street, N. Y.
Landberg, A.—Successor to L. Black & Co., Importer and Manufacturer of Optical Goods, 20 Maiden Lane, New York.

Rindig, Walter.—Repairing Spectacles, Eye Glasses, &c., punctually attended to. Pebbles on hand sent to order, 131 Nassau St., N. Y.
Strahl, Richard.—Manufacturer of all kinds of Optical Goods and Spectacles, No. 37 Maiden Lane, N. Y.
Stutts, Wm. J.—Manufacturer of Eye Glasses and Spectacles, Importers of Watches, Shell, (Price List by mail), 50 Maiden Lane, N. Y.

Rings and Shanks.
Byrant & Co.—Manufacturers of Solid Gold Rings, 14 Bond Lane, N. Y.
Bryant & Bentley.—Manufacturing Jewelers, 305 Paterson Hall Solder Rings, 12 Maiden Lane, N. Y.
Knapf, C.—Manufacturer of 14 and 18 karat Gold Rings, 14 Bond Lane, N. Y.
Whitman, H.—Manufacturer of Rings, 41 Maiden Lane, New York.

Silverware.
Cook, John.—Manufacturer of Silver Tea Sets, Pitchers, Walters, Cups, Goblets, Spoons, Forks, Knives, &c., 141 Liberty Place, N. Y.
Gorman Manufacturing Co.—1 Bond Street, N. Y.
Whiting Manufacturing Co.—Manufacturers of Sterling Silverware, No. 181 Broadway, N. Y.

Silver Plated Ware.
Manhattan Plating Co. 34 John Street, N. Y.—Fine Nickel Silver and White Metal Plated Ware, Repairing & replating on the premises.
Meriden Britania Co.—Manufacturers of Silver plated Ware, 50 Broadway, N. Y.
Rogers, E. B.—Manufacturers of Bellmetal Silver Plated Ware, No. 269 Broadway, New York.

Show Cases, Etc.
Boeker, John.—Manufacturer of Show Cases, Glass, Trys always on hand, 19 Howard street, N. Y.
Hall & Sun.—Manufacturers of all kinds of Show Cases, 100 Broadway, N. Y.
Kelly, P. J.—Manufacturer of all kinds of Show Cases, Counters and Refrigerators, 45 & 49 Chatham Street, New York.

Kraft & Hoffmeister.—Manufacturers of Metal Show Cases, Jewelry Trys always on hand, 8 & 10 Nassau Street, New York.
Kros, Frederick.—Manufacturer of all Sizes and Styles of Show Cases in Metal & Wood, 175 Chatham Street, New York.

Spectacle Case Manufacturers.
Richardson, Wm.—Manufacturer of Spectacle Cases in all Branches, 40 Fulton street, Ut Stairs, N. Y.
Koesen, A. & Erc.—Manufacturers of Leather Spectacle Cases, Eye Glass Cases, 21 Nassau Street, N. Y.

Thermometers Etc.
Tagliabue, Giuseppe.—Thermometer, Barometer and Hydrometer Manufacturer, 302 Pearl Street, New York, N. Y.
Thimble Manufacturers.
Burbank, Bond & Co.—Manufacturers of Gold & Silver Thimbles, 14 Maiden Lane, N. Y.
Ketchum Bro. & Co.—Importers of Gold and Silver Thimbles, 14 and 16 Liberty Place, near Maiden Lane, N. Y.

Walking Canes.
Pradley, J. P.—Manufacturers of Fine Gold and Silver Headed Walking Canes, 18 John Street, New York.

Watch Companies.
American Watch Co.—Robbins & Appleton, Agents, 17 John Street, New York.
Springfield Watch Co.—(Factory, Springfield, Mass.)—Morrow, Agent, 11 Maiden Lane, New York.

The Philadelphia Watch Co.—No. 818 Chestnut St., Philadelphia.
H. K. Adams.—No. 64 Fulton Street, N. Y.
The International Watch Company.—(Factory, 172 Broadway)—Agents, Schwab, Bro. & Co., 172 Broadway, New York, and 203 Notre Dame Street, Montreal, Canada.

Watch and Chronometer Repairer.
James, James.—Watch and Chronometer Jeweler and Patent Maker, 28 Nassau Street. Private inserted in Pinions, Balance, Studs, &c.

Watch and Clock Springs.
Brochon & Burnard.—Manufacturers of Watch, Clock, Chronometer and Musical Box Stock Springs, 17 Nassau Street, N. Y.

Watch Importers, Etc.
Abray, J. A.—Importers of Watches, No. 62 Nassau Street, N. Y. Sole Importers of Vacheron & Co. Fine Geneva Watches.
Alkins, Lambert & Co.—Importers of Watches Sole Agents for Paul Benoit & Chas. Labour, Watches, Watch Cases of all styles made, 14 and 16 Maiden Lane, N. Y.

Bodine, G. M.—Importers of Watches and Jewelry, 40 John Street, N. Y.
Bodine, G. M.—Importers of Watches and Jewelry of every description, No. 22 Maiden Lane, New York.
Bourgeois Brothers.—Importers of Watches from their own manufacturing at Bern, Switzerland, 20 Maiden Lane, N. Y.

Bryant, T. B. & Co.—Importers of Watches and Dealers in Diamond and Fine Jewelry, 327 Broadway, N. Y.
Conover David P. & Co.—American Watches, Wholesale Salerooms, southeast corner 7th and 8th Streets, Philadelphia.
Cross & Regard.—Importers of Watches, Watch Tools and Materials, dealers in American Watches, 21 Maiden Lane, N. Y.

Crovisier, Wilcox.—Co.—No. 1 Maiden Lane, N. Y., Importers of Watches. Agents for Charles Smith & Son, and Jules Huguenin, Lucie Suisse.
Droz, Henry D.—Importers of Watches and Jewelry, 100 Broadway, N. Y.
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Jennings, Wm. C.—Manufacturer of Watch Cases, No. 23 John Street, New York.
Laurent, V.—Watch Case Manufacturer, Gold and Silver American Watch Cases constantly on hand, 17 John Street, New York.
The Decker Watch Case Manufacturing Co.—14 John St., New York.

View.—Manufacturer of Gold and Silver Watch Cases, 189 Broadway, N. Y. top floor.

Watch and Chronometer Repairer.
Cur, B.—Practical Watchmaker and Repairer, 28 Nassau Street, New York.
Justing. of Fine Watches done for the trade, all work of escape and stem winding wheels sent to order.

Watch Case Repairers.
Chemidlin & Cordier.—Watch Case Repairers, 77 Nassau Street, near building, room 20, N. Y. Manufacturer of Silver Cases.
Tarboz, Hiram.—Watch Case Repairing, Springing, Polishing and Engine Turning, 79 Nassau Street, New York.

Watch Keys.
Clark, A. N.—Manufacturers of Light Metallic Goods, Watch Keys, Watch Case Importers, Combination Watch Keys, &c., Plainville Ct.

Watch and Clock Repairers.
Egler, Berly.—Repairs of Watches and Clocks of every description—Special attention paid to French Clocks, 30 Maiden Lane, N. Y.

Watch Glasses, Shades, Etc.
Berger, Albert. & Co.—Importers of Watch Glasses, Shades, &c., No. 47 Maiden Lane, N. Y.
Brown, Edwin.—Dealer in all kinds of Watch Glasses, Clock Mullers, Jewellers' Glasses, &c., 85 Nassau Street, N. Y.

Hill, Robert S.—Manufacturer of Watch Glasses, dealer in Imported glasses, flat glasses a specialty; also, Jewellers' Glasses, 75 & 77 Broadway, N. Y.
Walter, A. & Co.—Importers and manufacturers of Watch Glasses, Spectacles, Clocks, Musical Boxes, &c., No. 1 Maiden Lane, N. Y.

Watch, Pendulum, Spring and Wire Manufacturers.
Gammel & Colard.—28 Alford St., Islington, London. Half spring wire in spools, 36 yds. to 1000 yards; 4 per spool of 50 yards.

Providence Directory.
 A Guide to the prominent Manufacturing Jewelers of Providence who manufacture for the Jobbing Trade.

Bracelets.
American Bracelet Co.—Manufacturers of Thomas's Patent Telescopic Bracelets. 23 Foster Street, Providence, R. I.

Down, Chas. & Co.—Manufacturers of Jewelry, also of Initial Bracelets, No. 131 Downtown, R. I.
Irons, Chas. P.—Manufacturer of Solid Gold Jewelry, Specialty Emblems, Pins and Chains, 102 Westminster, 102 Westminster, Providence, R. I.
Sturdy & Marcy.—Manufacturers of Jewelry, 102 Westminster, Providence, R. I.

White, Foster & Co.—Manufacturers of Fine Plated Jewelry, Sets of Jewelry, Brooches, Chains, &c., No. 30 Potter St., Providence, R. I.
Allen, Samuel & Co.—Manufacturers of Fine Electro Plate Jewelry, 96 Pine Street, Providence, R. I.
Bride, Wm. M. & Co.—Manufacturers of Gold and Silver Jewelry, 114 Pine St., Providence, R. I.
Luther Bros.—Manufacturers of Fine Gift Jewelry, 102 Westminster, Providence, R. I.
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PLANNING THE ESCAPEMENT. VERIFICATION ON THE DEPTHING TOOL.

Take a cylinder, and the wheel riveted on its pinion, and put it on an arbor, and put the wheel and cylinder between the centres of a depting tool, having first adjusted the small tooth shown in Fig. 25, on one of the centres which holds the cylinder. This tool is composed of a triangle cut from a disc of brass, and riveted on a collet of the same metal. This collet is cut for the most part of its length so as to fit spring tight on the centre of the tool. The two lines, A and D, must form an angle of 45°, and the line, B, must divide the angle exactly in the centre.

quantity, C, D, Fig. 26, would be 16° for an opening of 190°.

If we note that the rounding off of the large lip takes something of the angle of escape, and that the inclined of the small lip occupies 10° on the cylinder, we will see that, really, the point of the tooth can come at rest only at about 4° behind the edge of the incline of the small lip.

The exterior root ought to come to about 16° from the edge of the large lip; but, as the considerable incline of the small lip causes the loss of a few degrees on the angle of escape, and also this inclined being the cause that the tooth, during the second half angle of escape, displaces on the

Fig. 25



If the cylinder carries a balance, we make a "range" mark on it to show the course of the angle of escape, or if the cylinder is without a balance, we have to fasten an index or hand on to it.

Suppose we have an escapement with the apparent angle of escape 45°. We close the tool slowly, moving the wheel with the finger at the same time, which will give to the balance a backward and forward motion. We move the tool, A, B, D, on the centre of the depting tool until the hand on the cylinder or the mark on its balance travels the same distance on each side of the centre line, B. The wheel must come to rest before showing 35°, or 38° of total angle of escape. Then we make the wheel escape, holding gently with the fingers locked and balance, and follow the motion of the wheel very attentively. If the tooth moves when the mark on the balance is yet 3° before the line of centres, B, the escapement is right, and we have only to draw it on the plate of the watch, resting one of the points of the centres of the depting tool on the escape wheel pivot hole.

If instead of 3° there were four or five, it indicates that the cylinder is too much opened, or the tooth of the wheel too much inclined. In ordinary practice we can let it remain so; but if the difference be more than 5°, we must verify the opening of the cylinder on the Jacot gauge. If it is too much opened we must change it, and if the spring is all right, the defect lies with the wheel, which has teeth too much inclined, and we must reduce them, being careful not to take off too much, for it will increase the drop.

If the tooth begins its motion when the mark on the balance is on the centre or

outside circumference of the cylinder an arc of a circle only equal to the one displaced on the inside circumference during the first half angle of escape, which arcs have not the same value in degrees, the result is that the tooth comes at rest at about 12° from the edge of the large lip.

Let B, D, Fig. 26, be the most elevated plane, its point will drop at C, and it is precisely the point where C will touch, since the cylinder driven to it by the plane, A, C, is carried to it by the plane, B, D.

The following is the practical method to find if the centre of the straight plane is on the centre of the cylinder. The opening of the cylinder being known and the escapement in its place in the plate of the watch, we move the balance, under which we have put a piece of paper, until the point of one tooth has passed on the large lip for the whole of the thickness of that lip for an angle of escape up to 20° on one side, or a little less for higher incline, and a little more for lower ones. In this position of the escapement, if the centre of the straight plane is towards the right of the cylinder the results will be that the back of the second tooth, on the other side of the cylinder, will be on the prolongation of the diameter, and consequently, the whole of the cylindrical shell over the half diameter will project the back of that tooth, which will be 16° for an opening of 190°, 20° for an opening of 200°, etc. In measuring exactly the opening of the cylinder, and examining rigorously if the form of the lips is the proper one, etc., we can easily place the centre of the straight incline by the centre of the cylinder or very near so, or at least in such a position as will give the best advantages.

Fig. 26



even beyond, then the cylinder is too much closed, or the teeth not enough inclined. If the fault is with the cylinder, we can alter it by polishing the large lip, but if it comes from the wheel, we must incline the teeth a little more.

The cylinder escapement is only strictly correct, when the centre of the straight incline passes by the centre of the cylinder.

When the back of the tooth escapes from the large lip and its point comes at rest inside of the cylinder, if we suppose the straight plane to be in the centre of the cylinder, it is evident that, since this inclined plane represents the diameter, all the part of the cylindrical shell over 180° is beyond the point of the tooth. That

OVERHUNG OF THE CYLINDER.

The balance of the cylinder escapement can make a whole turn, and if we want it to go further, when the balance turns from the right to the left, the bottom of the small cut of the cylinder, indicated by the dotted line, O, D, (A, Fig. 27), would come briskly against the arm of the U, and the tooth being past the large lip it would be stopped, and the cylinder would remain in the position shown in the cut A, Fig. 27. This is called overhauling.

The same thing will happen if the cylinder turns too much from left to right. Then the tooth will no longer touch the rest, but drop altogether inside of the cylinder. The arm of the U would go as far

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We are apt to look upon that instinct which prompts the savage to delight in bright colors, and to deck his person with ornaments, as an element of barbarism. Nothing is more fallacious. It is an element of human nature, as pronouncedly positive in the most cultivated and refined as in the "untutored savage." Civilization tones and modifies it, but does not eradicate it. Education teaches how art may be made subservient to ornament, and how the love of display and personal adornment, which exists alike in the palace and the hovel, may be made to serve a useful purpose by familiarizing the mind with things whose beauty of form or color educates and refines the taste. In this way, then, the manufacturer of jewelry, so long as they make intrinsic value secondary to beauty of design, serve a good purpose; and although the political economist may sigh over the time and money wasted for mere purposes of "useless display," second thought will tell him that it is not of necessity useless, and that the money spent in the purchase of jewelry goes to support a large and important industry, which gives employment to thousands of operatives, and plays an important part in the great work of keeping money moving. But enough of moralizing.

The goodly people, who, in the "good old colony times," furnished the silver of Providence, little thought that the time would ever come when the hamlet which they then named in thanksgiving would become a city of eighty thousand inhabitants, busy with trade, merry with the song of the shuttle and the hum of the loom, noisy with the ring of hammers, and, above all, preeminent among American cities as the home of manufacturers of "baubles" for personal adornment. They were a sturdy race, those first settlers in Rhode Island, and with their rigid views in the matter of "worldly things" and "vanities," it is questionable whether they would have looked forward with emotions of pleasure to the "progress" of the present day.

Until 1847, jewelry was made exclusively by hand in Providence. A piece of gold, a crucible, a few files, points, gravers, and other tools,—these were the outfit of a jeweler. He would make you a ring, a locket, a bracelet, a pin, a stud, a pair of earrings, or any article you might want. Designs were few and simple, fashion in such things was unknown, and an article of this description, once bought, was good for a lifetime. But at about that date the business took a look upward. An outside demand began to come in from sections which did not suspect jewelers of their own, and the thrifty manufacturers of Providence, having made up a stock of goods to send to their advantage to make a trip to New York, carrying their wares in a trunk, and all to dealers who, while they were blessed with custom, had no skill to make the goods their patrons wanted. Suggestion makers saw that certain styles "took," while others did not please. The first, then, must be made in larger quantities, and the latter neglected. The West, poor but proud, wanted to adorn itself, and was sharp at a bargain. It bought in the cheapest market. Providence knew that if the cost of jewelry would be reduced twenty per cent., the increase in trade would be at least fifty. It did not, at first see its way clear to reduce the price of the material, but "labor-saving machinery," the Yankee's unfailing resort, could cut down the cost of labor. On this lead they went to work. Pieces which had heretofore been made by hand, a slow and tedious process, were, by the use of dies and a falling weight, "struck" rapidly and well. Others, fashioned into the desired shape out of plates of metal, were punched out under the screw press, and what had been the work of a skilled hand for a day, a boy could do in an hour. Next came the division of labor. Men no longer worked at all branches of the trade. Some turned their hand to bracelets exclusively, and learned to make nothing else. Others devoted themselves to chains, while others still spent their time and energies in the construction of pins and earrings. These were the manufacturers, the

proprietors of shops. With their men the division of labor was still greater. Each had a certain part to make of the articles which his employer manufactured, and did nothing beyond it, a policy which tended, as it does in all branches of manufacture, to secure good work in every part, and the greatest attainable economy of labor.

Monting and assembling, however, was introduced. The rich wanted their jewelry of gold entirely, and could afford to pay for it. But those in humble circumstances, much more numerous, were quite as anxious to deck themselves with jewels provided it could be done within their means. To accomplish this, plated goods were introduced. Taking a bar of base metal, say copper, brass or German silver, the workman brazed upon it a thin plate of gold, whose thickness, compared with that of the bar, was one to ten or twenty. This he passed through rollers, constantly lessening the distance between them, until the bar was reduced to the desired thickness. Perhaps it was a twentieth of an inch thick, perhaps less. In either case the proportional thickness of the gold coating remained the same. Out of this "stock plate," as it was called, he could fashion any desired article, and so skillfully could he turn an earring and avoid the expense of gold, he could turn out a pin or ring, and truthfully say that all that you could see was gold, and prove it by applying the acid test.

Next came electroplating, preferable because the subtle agent would carry a coating of gold, of any desired thickness, over every part of the article immersed in the gilding cell, no matter how irregular the surface, but less desirable than the "stock plate," because less durable, owing to the soft and spongy nature of the gold deposited. But it was found to produce beautiful and "taking" effects, and to be of the greatest value in the manufacture of the cheap grades of jewelry.

The war caught the jewelers of Providence in a sorry plight. For a year or two prior to that event, the South had been prosperous, her jewelry and "finery" and they spent their money freely. They bought liberally of jewelry, paid good prices, and paid promptly when their accounts fell due; and, alas! when Northern buyers were no less prompt in their payments, they were prone to drive clever bargains. So Providence devoted itself in the jewelry line, to meeting the wants of the Southern market, and looked forward to a full tide of prosperity. But the war came. In many instances Southern buyers, forgetting, as too many of them did, their business honor in their partisan array, repudiated the debts they owed in the North, and no line of trade left the shock more severely than the jewelry manufacturers of Providence. One after another they were forced to the wall and to give up business, and many of them failed disastrously. Some having means behind them, and believing in a better future, held on. They were the fortunate few. The re-entrance of the Government into heavy disbursements of money of its own manufacture. Business took a start in all lines. Money became plenty in the hands of those who, in former times, had laid more than enough to supply their actual wants. Soldiers received rich bounties, and spent them with lavish hand. Luxuries were in demand, and none profited better by the demand than did the jewelry manufacturers. "The advance in gold" was a never-failing excuse for high prices, and, for a time, those who had weathered the storm reaped an abundant harvest of gain, paying any price upon their wares that suited them, and finding ready sale.

It is not to be argued that the old manufacturers were going to stand by and see the jewelry business go into the hands of a few new shops started into operation in rapid succession, and Providence once more became a great centre of the jewelry trade. Here, houses increased in numbers, in importance, and in variety of the work produced. Some went to gold, and would make nothing from any base metal. Others limited themselves to stock-plate, while others still went in for cheap goods for the million, with the percentage of profit which such ventures, when successful at all, generally bring.

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nate relations which it established with New York in the early days of the trade. Any of the houses there manufacture exclusively for New York houses, which, in some cases, guarantee to take their whole order, and in others sell their goods on commission. Although geographically such nearest to Boston, the business men of this thrifty city look upon New York as the central sun about which they revolve, and even hint that Boston is but a mere planet in its constellation. You will be told, in office after office, that "The headquarters of this concern are in New York, sir." We sell all our goods through our New York house, which has its travelers out in all sections of the country, and they probably find their way to Boston as well as other cities. But we have no direct relations with Boston.

In no line of business is more ingenuity, skill and taste needed than in the production of jewelry, and some of the Providence houses have a well-earned reputation for pre-eminence in this respect. At first in getting out their designs they were content to copy the productions of foreign workmen, but of late years they have launched out for themselves, and now employ some of the most skillful designers to be found anywhere. They labor under a disadvantage from the fact that when they produce a new and taking thing which the other houses proceed at once to copy it, but as this is done by all to all, matters adjust themselves in the end.

At the present time the business of manufacturing and selling jewelry has become settled upon a firm and reliable footing. Competition in the business is close, to be sure, but to those who understand it, and who give it their attention, a more than reasonable profit is assured. The various houses are as unrelaxing as ever in their efforts to find more rapid and more economical methods of turning out work, and every now and then you will be shown a machine which the busy brain of some foreman or proprietor called into being, and which has resulted in a saving of one, two or three hands. The effort seems to be, now, to make jewelry cheaper by lessening its cost and the house that can save a dollar a dozen in the cost of making bracelets of a certain grade does not hesitate to "cut under," to the extent of that dollar, keeping its profit the same as before.

The Metropolitan Museum of Art.

Now, in case No. 13 there is a blue and white China double bubble. If you go to the Cesnola collection, you will see the same idea repeated in common earthenware made thousands of years ago, which notion of making a vessel contain two kinds of fluids was repeated later by the Greeks, and was used by the old Mexicans. There are 9 there is an elegant piece of Persian in shape, and graceful in proportions, with elegantly-turned nozzle and handle, in direct opposition to the usual shape and groveling forms of the Chinese. Have not the Chinese, without being an imitative race, been always fashioning their wares according to the wants of their customers? That pitcher was made for the Teheran market, and not for America. In the Avery collection may be seen specimens of the imperial Celadon yellow, which is so rare, and of the ruby and of the green. There are also innumerable pieces of the curious crackled ware, or snake porcelain, as the Chinese call it, which is made to crackle in the piece would make many an English dweller crazy with envy to possess it. This crackling is one of those cases where a defect has been made to supply the place of a beauty. The crackling is produced while the piece is in process of manufacture, before the glaze is set on. In case No. 16 there is an endless collection of cups, saucers, and plates. If they should represent single specimens of white nets the possessor of them did the best thing, who has a pocket watch every day in the year with an entirely different service of china. Let us single a plate which we think to be

Japanese. Observe how curious are the details, and what a strange combination there is between absolutely finicky ornamentation and bold effect. The border of the plate is made up of small hexagons, one within another, hardly a quarter of an inch in size, all made up of double lines, touched with a brush which must have been fine to a hair; each angle of the hexagon is marked with, a distinct point, and this elaboration of what must have required painful toil goes almost all round the plate. Then suddenly there is a clear, open space, and in that there perches a bold, imperial falcon, absolutely perfect as to detail of feathers which he flashes in color like a humming-bird. Does the bird stand in a window? There is, though, a curious, puzzling, black thing, which hangs upon apparently out of place, and it takes a moment to discover what it means. A little careful examination shows it to be a tassel, and a tassel suggests a string. Now the story is plain. The artist has been struck by some remarkable fan, the fan has a tassel, and he has clapped the fan on the plate, and on the fan a bird was painted. Now no European artist would have ever dreamed of producing so strange an effect, or by such means.

Very funny among the plates is a Chinese adaptation of St. John the Baptist, and the immersion of the Saviour. St. John is ludicrous to behold, with one leg in the water and the other a mile away on the banks of the Jordan, all recalling Hogarth's picture of false perspective. What is strange among some of the saucers is the occasional adaptation of European ornamentation to the borders to a Chinese subject in the middle of the piece. The two civilizations clash, and this artistic miscegenation produces a monster, which, however, is not the less prized. If in Chinese work, the European artist may be indifferent as to forms, and pass over the decorations which are *en route*, he would be blind or ignorant but he does not appreciate the superlative excellence of the color and the purity of the tint. These far off Orientals have still secrets in their colors which we do not possess. We do not exactly mean their treatment, but their monopoly of the materials. Take a Japanese fan. There may be no end of signs of realistic truth in the forms, but then look at the pigments. The sun does not set, it is true, with that incandescent blue; but neither Newman nor Winsor & Newton can produce such water colors as the Japanese. There is, too, in Room K, a pair of Japanese bronze vases which are wonderful. What extreme patience, what delicate taste must have been employed in making them. They could not have been cast; no elastic moulds, such as we use now, would have sufficed. The foliage stands out leaf by leaf, and each twig on the tree is perfect. The slight irregularity in the ornamentation of the vase—pleasant from the very fact that it lessens the rigidity of mechanical work—shows that it was cut out inch by inch by hand.

In Room D there is a large vase of Chinese *celadon* enamel, supported in three storks (ostriches?) This is barbaric when compared with the more delicate Japanese work. Still there is wonderful color in it and no real lack of delicacy. There are here, too, many curious little bits of Japanese ivory work. Two of them we will note. One has for its subject a Japanese woman always seen in the Japanese for the contrast. Down stairs among the pictures, at least, there was some time ago (it has been removed within a week) a clever bit of old work called "Beauty and Death." There was a lovely woman's head, and back of her there grined a hideous skull. Such a collection as the Metropolitan allows one to make just such comparisons. Here we find the Japanese artist having a conception similar to the European painter.

Now there is another little bit of ivory worthy of mention. You could not say that it recalled the Laocoon, for it is not over six or three inches in size; but it is a woman and her two or three children struggling with an octopus, and the Japanese artist has been faithful in making the pinprick details of each of the terrible creature, while he has been terribly false as to the head of the octopus, which he makes almost human. But then, as in

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America and Japan, neither writers, nor painters, nor sculptors are required to be perfect in their natural history.

There are specimens of Loo-chow lacquer here, and Japanese lacquer work which no European art can equal. Patents in the United States are innumerable, all tending to make artificial stones. Now in Room K there are specimens of the porcelain used to construct the Tower of Nan-kin. Examine the glaze on the pieces. It is as perfect today as when it left the kiln, and the pieces are more lasting than any stone we can make.

It is well, in a collection of this character, not to lose certain practical ideas which should be ever present, and to compare what we see, the productions of other people, with our own work. There are certain shapes, particular forms apart from any decorative details, which remain constant. What is best adapted to man's wants—the most comfortable, in fact—is a type of form which repeats itself for ages. It may be ludicrous to compare a water vessel, made by the Phœnicians and disintegrated by Gen. Di Censola, with an ale telly fashioned by a Wedgwood, but such exact similarity of conception, though different as to material, actually exists.

The Chinese and Japanese collection in the loan museum is remarkable for its excellence and variety, and serves as a fitting introduction to those European wares, the Majolica, the faience, the Sevres, the Dresden, which will be hereafter described.

Finger-Rings.

We do not always look for wisdom in the rulers of the earth, and therefore need not be surprised that a superstition observance was upheld by the kings of England. Similar to the curious practice of touching for the king's evil was that of halloving cramp rings. Every Good Friday the king halloved with much ceremony many certain rings, the wearers of which were saved from the falling sickness. The practice took its origin from a ring long preserved with great veneration in Westminster Abbey, which was supposed to have great efficacy against the cramp and falling sickness, when touched by those who were afflicted by either of those disorders. The ring was reported to have been brought to Edward the Confessor by some persons coming from Jerusalem; and to have been the same that he had long before given privately to a poor man who had asked alms of him for the love he bore to St. John the Evangelist. In the "Liber Niger Domus Regie Edm. IV." is the following entry:—"Item to the king's offerings to the cross on Good Friday out from the countess-house for mediceable rings of gold and silver duly delyvered to the jewel house xxvi." The practice was discontinued by Edward VI, but in the previous reign Anne Boleyn sent some rings to Mr. Stephens, with the following letter:—"Mr. Stephens, I send you here cramp rings for you and Mr. Gregory and Mr. Peter, praying you to distribute them as you think best." Galvanic rings are now comparatively rare, but in old times they were common. It is supposed that the fashion of having mottoes or "reasons," as they were called, was of Roman origin, for the young Romans gave rings to their lady-loves with mottoes cut on gems, such as "remember," "good luck to you," "love me, and I will love thee." In the fourteenth and fifteenth centuries the ring was inscribed on the outside of the ring, and in the sixteenth and seventeenth centuries it was placed inside. In the year 1624 little book was published with the following title:—"Love's Garland; or posies for rings, handkerchiefs and gloves, such as pretty children that lovers send their loves." Some of these mottoes have become pretty well hackneyed in the course of years; thus the Rev. Giles Moore notes in his journal under the date 1674-3, "Bought for Ann Brett a gold ring, this being the posy—"When this you see remember me." In some cases instead of words the stones

are made to tell the posy by means of acrostics; thus to obtain Love the following arrangement is made—

For the words *Dearest* and *Regard* the stones are arranged as follows—

For *Love* me; malachite and another emerald are added.

In one of these rings belonging to a gentleman the lapis lazuli dropped out, and he took it to a working jeweler in Cork to be repaired. When he got it back, however, he found topaz in place of the lapis lazuli, and therefore he told the workman a mistake had been made. "No mistake," answered the jeweler, "it was Repeat; let us Repeat, and we may have it yet."

Names are sometimes represented on rings by the same means; and the Prince of Wales on his marriage to the Princess Alexandra gave her as a keeper one with the stones so set as to represent his familiar name of *Bertie*, as follows:—

B emerald,
e topaz,
r ruby,
t turquoise,
i sapphire,
s emerald.

The French have precious stones for all the alphabet with the exception of f, k, q, y, and z, and they obtain the words *Souspire* and *Amilite* by the following means—

S sapphire or Sardouine,
a onyx or opale,
m malachite,
u emerald,
r ruby,
i sapphire,
t turquoise or topaze,
s emerald,
e emerald.

The fiancel or wedding ring is supposed to have originated at Rome, where it was usually given at the betrothal as a pledge of the engagement, and its primitive form was that of a signet or seal ring. The practice of the wife wearing the betrothed ring after marriage, and the husband the wedding ring, has been a common one in Germany. The betrothed and wedding rings of Louis being preserved safely in his native country. The first of gold elaborately worked with the various symbols of the Passion of the crucified Saviour, as spear, nails, the rod of reeds, the dice, etc., and the whole is surmounted with a ruby, the emblem of exalted love. Inside are the names of the betrothed pair, and the date of the marriage (Der 13 Juni, 1825). This ring was presented by Luther to Catharine Boren at the betrothal, and was worn by her then and after the marriage. The workmanship is very elegant, and it has been supposed that it was designed by the great reformer of Munich Lucas Cranach, but the design was no by means an uncommon one. A gold ring was found in Coventry Park, near the Town Hall, in the autumn of 1667, by a person digging potatoes, on which was represented the Saviour rising from the sepulchre, with the hammer, ladder, sponge, and other emblems of his passion by Him. Five wounds were shown, which represented the Saviour rising from the sepulchre, with the hammer, ladder, sponge, and other emblems of his passion by Him. Five wounds were shown, which represented the Saviour rising from the sepulchre, with the hammer, ladder, sponge, and other emblems of his passion by Him. Five wounds were shown, which represented the Saviour rising from the sepulchre, with the hammer, ladder, sponge, and other emblems of his passion by Him.

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Practical Hints on Watch Repairing.

By EXCELSIOR.—No. 1.

The series of articles of which this is the introductory one will be pre-eminently practical. Not only so, but they will dispense theory—far from it. A knowledge of the theoretical principles of any art is the proper preparation for the most successful practice in it. But if we should go to the philosophy of our trade the whole of the JEWELER'S CIRCULAR would not be sufficient for its proper treatment, and those who needed the instruction the most would not read it at all.

The majority of watchmakers would give more for an account of the actual practice among good workmen than for all the theoretical treatises ever published. This is not as it should be, but it is considered the part of wisdom to take things as they are. Hence, the editor, with a keen appreciation of the wants of his readers, and a liberal intention to do everything possible to fill them, instructs us in five articles "practical and exhaustive" going to the bottom of the subject, and useful to advanced workmen, as well as those with less experience. This we have undertaken to do, but with the proviso that we may smuggle in occasional doses of theoretical knowledge, will sugarcoat so as to have a practical flavor and go down easily.

The truth is that a very large share of our watchmakers are but imperfectly equipped, either in theory or practice. The foreign system of long apprenticeship is not in vogue here, and even if it were the most of our employers are not really content to instruct apprentices. Many of them are not workmen at all—only dealers in the goods of our line. Such as are good workmen are becoming more and more averse to taking apprentices, because their time is too valuable to allow of giving thorough instruction, as they better could afford to do under the old apprentice laws, which on the whole were certainly better for both masters and men. The result is that half-learned workmen abound—most of them conscious of their shortcomings and anxious to learn. They find themselves compelled to educate themselves, and to make their living while doing so.

Again, many workmen have fully learned their trade, according to the old style, but everything has changed greatly since then, even within the last ten years, and they find that they are getting out of date. There are new kinds of work to be done, new tools and machinery to be used, new materials, new ways of working and above all, greater excellence in every respect is required than would have sufficed in the old verge and lepine days. This change is constantly going on, even now, and the good workman of to-day will soon be left among the old fogies unless he keeps himself informed of all the current improvements.

There is scarcely any horological literature in the English language suitable for the wants of practical workmen, and even the works in German and French are generally so full of abstruse theories and mathematical formulas as to repel all who have not a superior education, fitting them to cope successfully with such problems. I notice, however, an excellent translation of Samiier's *Traité de Horlogerie* now running in the JEWELER'S CIRCULAR, and I myself shall occasionally borrow from other similar works.

Both of the classes named want to learn, but how shall they do so? Some pay their money to traveling quacks for the "secrets of the trade." Others pick up scraps of information from periodicals, from casual acquaintances, and from their own experience and study. A few go to the cities to take a course of "finishing" instructions from resident practitioners, at a dollar per lesson, more or less. This is very well for advanced workmen who can comprehend at once what is explained to them, but it is almost worthless to those less experienced. For they are told very briefly what to do, with a trifling amount of showing, and then left to study out the remainder of the oracles themselves—if they do not forget a good share of it before they succeed.

In these articles I shall give such directions that any workman of ordinary capacity may stay at home and learn all that he could by spending a year's savings to get the same in other ways—and I shall tell some things that even the quacks have never heard of—all without costing the readers of the JEWELER'S CIRCULAR a single farthing, and with the advantage that, being in print, they can refer back to any very words and details a hundred times if necessary, and study and practice on them *ad libitum*, till they are perfectly familiar with every point.

But I wish them to mark this—They can never really know a thing till they have actually done it, and discovered by experience the peculiarities, dangers and difficulties of each operation. It matters not how carefully they read and understand, they must practice also. Instructions alone will not make one a workman, any more than a book of prescriptions makes a man a doctor. Therefore they should take the first opportunity, or make one, to put my directions in practice. They will then learn many minor points which space compels me to omit, will understand better what I do say, and they will remember it. Otherwise, as far as they lose sight of the book they will know scarcely more about it than they did before. So when a small tool or fixture is described, let them go to work and make one. Each one will take but little time, which they will never miss, but they will soon have a goodly collection of them, at the mere cost of material, which they could not buy for any money, for the good reason that most of them are not on sale; and, being made by them, they will know how to use them.

Let no one feel discouraged because he has never had proper instruction in the trade. If he really desires to be a good workman, and has true grit in him, there can scarcely be any training more severe and improving than patient study and practice, working out of his own resources, and being held responsible for the performance of his work, either by an employer or by a customer of his own. If he persists in doing the best he can, and improves every opportunity to learn, he will gradually regain the ground he should have made during his apprenticeship, and may in time become the equal of any, and the superior of those with greater opportunities but less determination to excel. A large share of our very best workmen are thus largely self-taught—thorough, independent, versatile and progressive, but the lack of a long and rigid apprenticeship has cost many of them a fearful loss of time in the best years of their life—a loss which it is the object of these articles to lessen for their readers.

Habits are all powerful with a workman, and I feel the importance of not leading any one into faulty or inferior ways of working. I shall try to tell all that is worth the telling, and worthy of being included in a first-class method of procedure—is in fact, to give the latest and most advanced state of practical horology, so far as concerns watch repairs. This involves examination and comparison (either experimentally or judging from general experience) of perhaps scores of different tools, methods, etc., each claimed to be the best, in order to sit out and arrange a complete, uniform and practically reliable system in each branch of repairing. While I shall not give all the new and visionary ideas floating about, I shall also exclude many old and generally accepted ones which I consider wrong in principle or superfluous, by better methods. I shall not only try to tell what is not generally known, but also of things very commonly done, but seldom done well, at least by learners, and which they need to know about, as they are at the root of all good work; of some things that are highly important, and also of "little things." But the little things are often just what constitute the difference between the good workman and the botch, which the former has learned by long and bitter experience, the fruit of years of labor, study and trials.

Much of what I shall say will, of course, be the standard practice among good workmen, and to them new to the trade. But I must take the risk of telling what is

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familiar to such, for the sake of that much larger class who have not had the opportunities of the former for learning. Another large share, however, will be the results of my own experience, investigations and observation, new and valuable even to experts and first-class workmen. I shall not claim perfection, either in judgement or experience, but if any specialist knows more about any particular subject than I do, the writer, has a better way or tool than I have, and will prove it by writing out his views thereon, I have no doubt that the editor and all workmen as well as myself, will be glad to have him do so.

What we need in our trade is more life, study, interest; more discussions and even quarrels, if necessary, to wake us up; more rivalry in letting such light as we have shine for the benefit of all. And if I should use rather sharp language in regard to some persons and things in the course of these articles, as I propose to do, my sole object in stirring them up will not be any personal feeling or prejudice, but a desire to let the exact facts, according to my knowledge and belief. I shall adopt the plan of numbering the sections, in order to avoid repetition, so that any directions once given may afterwards be definitely referred to and easily found.

Before closing I wish to give a few words of advice which will have a very wide application, although addressed especially to young or inexperienced workmen. They should clearly understand that there is no royal road to success in our trade. No amount of experience or knowledge, no costly instructions, or "trade secrets"—nothing whatever will suffice except good, honest, thorough work. Whatever other advantages they may have, that is the one indispensable thing. A watch is a machine; when it is all right throughout, it will perform properly, and not before. Experience with thoroughness will make a fast workman, but never without it. He should never knowingly do any part, however small, for even after he has done his best there will always be enough to apologize for. This is what all the workmen will tell him, and which will settle down at once and forever upon that basis, and dismiss all ideas that there are any "secret ways" or ways that are not secret, known to any one, which will enable him to dispense with that requisite. Therefore it will be well for him to make up his mind never, under any circumstances, to shirk his work. He should do this for the sake of his reputation as a workman, of his self respect as an honest man, and of avoiding the habit of shirking, which will surely grow upon him if indulged, till he will become actually incapacitated for doing a thorough job, by indifference and indolence to exert himself.

On the other hand, don't do too much. This is a great fault with the inexperienced. They file and bend and hammer and cut off and make the most radical changes in the slightest grooves or holes at all. Now, a workman has no business to change any part of a watch unless he knows the precise purpose of it, and why; and of its peculiar construction; knows that it ought to be changed, and knows what object it is desirable to accomplish by changing it; that the proposed change will accomplish that object, and how to make that change in a workmanlike manner. If he does not know the difficulty and its cause, and the proper remedy, he has no right to butcher a watch on the "cut and try" principle. When he cannot improve it he should at least not make it any more, but rely more on head work and less on guess-work. That, after all, is the real secret of excellence. Of two men, alike in every other respect, the best thinker is invariably the best workman.

Swiss Watches.

Berne is the canton in which there has been the greatest rise in the manufacture of watches of late years. It is computed to produce five hundred thousand watches a year; and, as they are almost exclusively of ordinary quality, their average value may be set down at forty francs, which would bring up the total of Berneese annual production to twenty millions francs (\$4,000,000).

Geneva does not supply much over one hundred and fifty thousand watches year-

ly, but as eleven-twelfths of these are gold, and in part richly ornamented, their value does not probably fall short of twenty million francs.

The canton of Vaud also turns out one hundred and fifty thousand watches per annum, the works of which are generally highly finished; but then they are in great measure exported without case, as mere works, the average price being about thirty-five francs, which brings the total value to eight millions.

Besides these the canton of Vaud furnishes eighty thousand musical boxes, which amount to eight millions more. In respect to value, Neuchâtel has credit for about half of the entire Swiss watch making (thirty-five per cent); the cantons Geneva and Berne come in for twenty-three per cent, each; and the canton of Vaud for nine per cent.

Hints to Watchmakers.

Silver Alloys.
No. 1.—Silver 11 oz., 2 dwts; copper 16 dwts.

No. 2.—Silver 1 oz.; copper 1 dwt., 12 grs.

No. 3.—Silver 1 oz.; copper 5 dwts.

Alloy for Plating.
Silver 1 oz.; copper 5 dwts.

Silver Solder.
No. 1.—Silver 1 oz.; pin-brass 10 dwts.

No. 2.—Silver 1 oz.; pin-brass 10 dwts.; pure spelter 2 dwts.

In fine silver filigree work, fine silver is always used for the filigree. The frame-work is generally made of sterling silver. The solder for such work is as follows—Silver 4 dwts., 3 grs.; pin-brass 1 dwt.

Copper Solder, for plating.
Silver 10 dwts.; copper 10 dwts.
This is a useful solder for plating or soldering silver work; it never eats as does silver solder.

Common Silver, for Chains.
Silver 6 oz.; copper 4 oz.

Solder for the above.
Silver 16 dwts.; copper 12 grs.; pin-brass 3 dwts., 12 grs.

Silver Solder, for enamelling.
Silver 14 dwts.; copper 8 dwts.

Common Silver Solder.
Silver 20 oz.; pin-brass 13 oz.; spelter 1 oz.

Solder for filling steel rings.
Silver 20 oz.; copper 3 oz., 8 dwts.; pin-brass 13 oz.; spelter 1 oz.

Quintessence Solder.
Silver 1 oz.; pin-brass 10 dwts.; bar tin 2 dwt.

Silver solder for gold plating.
Silver 1 oz.; copper 3 dwts.; pin-brass 3 dwts.

Bismuth Solder.
Bismuth 12 oz.; lead 15 oz.; tin 21 oz.

IMITATIONS.
Silver 1 oz.; nickel 1 oz., 11 dwts.; copper 2 oz., 9 dwts.; spelter 10 dwts.

Imitation Gold.
Silver 2 oz., 5 dwts.; copper 1 oz.; composition (44 oz. copper to 5 oz. spelter), 1 oz.

Communications.

Editor-Readers' Circular:
Sir—Some time ago, one of our watchmakers submitted his machine to my inspection, which he had contrived for the purpose of setting jewel holes. I think it very simple, and after some alterations I had to propose, it seems to me that it is the best of all the machines for this specialty, that came under my notice. It is self-acting, and brings two, three or four jewels into action, as the case may require. It is suitable for so much the setting of jewels of all sizes, that any one will succeed with it without previous practice.

Patents are applied for, and as soon as they are granted, I will have the pleasure of giving detailed description in your columns. The inventor intends to offer his machine in three different executions, in order to meet each acquirer's wants.

1st. (Fixture) As an appliance to the common turn, (or provided with a special fixture).

2d. As a fixture easily applicable to the Geneva Universal turn, or any lathe of similar kind.

3d. As a special machine with or without hand-wheel. This latter form will serve at the same time a number of other purposes.

M. GROSSEMAN
Glasbütte, Saxony, Jan'y, 1875.

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An Improved Latho for Watchmakers.

To the Editor of the Jeweler's Circular:

As I have suggested that watchmakers should make public their discoveries and improvements for the benefit of the trade and to show that they are willing to follow the advice I have given to them, I send you a description of a new latho for the general use of watchmakers. I have had a portion of it in a cruet form, in use for nearly twenty years, and it has been very largely improved, changed the whole, and added many improvements, in accordance with a thorough knowledge of the wants of practical watchmakers, full acquaintance with the latho now in use, and long experience with this one, so as to think your readers will agree with me in considering the result as almost the perfect latho so long and ardently desired.

In the first place, it practically combines all the advantages of the old steel bow latho, or "turner," and the spindle latho—represented by the common Swiss jewelling latho, the Bottani's latho, the American, and others built on this plan. All that can be done on any spindle latho is capable of being done on mine. It uses either solid or split self-centering chucks, or wax. Anything that can be done on the "turn" can also be done this in the same way, and when a workman in using the jewelling latho, comes to a job he has always done in the turn, he can proceed to do it in this latho in his old familiar way.

It can be used with the foot wheel and treacle, thus as the treacle latho, or be run by the foot without a wheel and treacle, or by a bow, or by hand without a bow. It can be screwed upon the bench or substituted for any other spindle latho, and use either solid and treacle, or if it is in use, it can be held in the bench vice like the turn, while being used as a jewelling latho, or a dead center latho as preferred. In any case it can be loosened and removed in an instant and laid away in the tool box, or can be just as easily replaced and used again. When held in the vice it can be run by the foot or hand, in a way different from anything else I have ever seen, and so simple as it is efficient, securing a continuous motion in one direction.

Whether it is fastened upon the bench or in the vice, it can be held either horizontally, as usual, or vertically, and run in that position. This is a great convenience to the workman in many cases. When he has a long job of some work that requires him to look sideways, it is almost unendurable to keep his head and neck twisted. By simply turning the latho up, he can see plainly without twisting himself, work easily and comfortably, and some kinds of work can be done better in this position than in the usual one. It changes from one position to the other requires but a moment.

I use the same form of chucks as the American latho, but will not split, but the manner of holding them insures that if they have ever been made true they will invariably come true again. They have been found to wear out much less. But in this latho such injury is almost impossible; for it is so safe that the chuck is in the other latho, in drawing them tight, but the pull is straight back in the direction of their length. They have a firm true bearing both at their front and back ends. In the interior of the spindle, insuring their being truly in line, and strengthen the spindle at its weak point, the front bearing.

The nut for tightening the chucks is not reached at the rear end of the spindle, as in the American latho, but at the front. This is handled across the use of the long hollow cylinder with the lead screw for tightening, and enables us to have a longer spindle with the same amount of metal, and asking less in the way of cost.

This also allows the spindle to be held tight near the back end, and there comes to a point, as the Swiss and Bottani's spindles, reducing the friction to the smallest amount, and making it easier to tighten up and adjust. In its bearings it will take in a wire nearly as long as the spindle, which will answer all ordinary wants of steady regularity, and it practically combines all the advantages of the American hollow spindle, and the plated spindle. This also admits of protection for removing one spindle and substituting another, after the Swiss plan, so that two or three of work can be fitted before disarranging either in its wax or chuck end tools.

I recall the splitting of the bed piece, an objection in the American latho, and all others built on that plan, and thus make the bed very strong and solid. At the same time I am able to pass my rest beyond the center, the same as in the American latho.

When my latho is held and used in the vice, the spindle is at right angles to it, and has had tendency to start on again of itself, so as to be in the case with the wheel and treacle when not perfectly balanced. Yet there are no "dead points" to interfere with quick starting when desired.

There are other minor advantages, to which I will not allude, as I have already taken considerable space, and it might appear that my latho was very complicated. But that is not the case. Everything is effected by the simplest possible means, one part serving several uses, and the whole almost a wonder of simplicity, considering what it accomplishes.

It will be seen that I have not tried to make a combination tool, or to increase the kinds of work that can be done on it, but that I consider rather at a fault; as the more things a tool will do, the more it is liable to do any of them well. My object has been to render the labor less fatiguing and injurious to the workman, and enable him to do whatever he wishes easier, and, of course, better—that is, not to make a universal tool, but

a perfect latho, and to fit it for use in all circumstances and places.

A point of special importance to "jour" workmen is that they can carry it with them, and in shops where there is no wheel and treacle under the bench they can use it in the vice. This removes the reason why many workmen use the bow latho—because they can carry that and all their favorite instruments and tools. The workman ought to have his own latho and fixtures with which he is familiar. This latho he can carry complete, and use wherever he happens to be, and when not in use he can lock it up safe in his favorite trunk or box.

Of course the main points of the new hand or foot propelling mechanism, the mode of holding and elevating and using the latho, the chucks and chucks, are separable, and either one may be separately applied to other lathos. But I do not wish to keep them together, and in view of its combining of valuable features I have called it the Perfect "Union" Latho, and think it may fairly claim to unite the good qualities and capabilities of all the lathos now in use, and to be well adapted to defend, and adding many advantages not possessed by any other.

I am preparing to get it manufactured, so as to offer it to the trade, when I shall be happy to furnish an engraving and detailed explanation, if agreeable to the Editor. Manufacturers and others interested will please examine my special notice on the editorial page.

C. E. PRITZ, OREGON, N. Y.

The Compensation Error.

For the Jeweler's Circular:

They have started, in a new direction, on inquiry into the "Compensation Error," in the numbers of the *British Horological Journal*, and from the extreme simplicity, no doubt, overlooking both their mental eye the most effective cause of loss in finding compensation balances, so far as the law mentioned is concerned, and the trifling force. Mr. Webster in the February number corroborates what Mr. Imbach says in a previous one, and adds the effect of heat on the unbalanced rim as facilitating the centrifugal effect, while it causes the stretching the thread of the argument a little more in the same direction, in adding the isoperic heat, in heat, of larger sections, in the balance. Further I will not iterate—only call attention to the fact.

Mr. Webster suggests the idea, but does not remove the effect of the centrifugal force—thicker rim may be longer or that equivalent in heavier weights, in order to be effective compensation. The centrifugal effect attaches to it, and will not be so much affected by the law of compensation balance; which, if for one have discarded long ago, except where it is preferred by the patron.

Mr. Imbach started the above mentioned balance, but it is not the same as the one of Mr. Webster added the effect of heat on the rim.

Now, it is an impossibility to retain the same exactness, in the balance, as the one of Mr. Webster, as compared with heat, even when the oil, used on the balance, is of the best quality.

This is not all, as the oil deteriorates, the difference in extent augments, and of course the centrifugal effect develops from month to month from the impure necessity of lubricants cause alone; and, with reference only to the centrifugal, and not to increased lateral friction effect on the spring; which latter is however so affected from the centrifugal, but, so part of this article. Here then are two distinct sources of annoyance in the oil; one direct, and one indirect.

J. MCLA.

PROCEEDINGS OF THE HOROLOGICAL CLUB.

A Distinguished Body of Watch and Clock Makers.

Continuation of Mr. Fritz's paper, read before the Horological Club.

In the meantime, any watchmaker who may feel disposed to experiment for himself will find the numerous details I have given useful in pointing out the easiest course, the different laws bearing on the subject, and the object which each one is adapted to accomplish.

During the debate upon my balance at the last meeting of the Club, Mr. Uhrmacher very justly remarked that the difficulty of adjusting it, looked at first sight more formidable than would be experienced in practice, and that after the correct proportions of the different parts had once been determined, balances on this plan might be easily, rapidly and accurately constructed—which is really the case.

But when he added that the inventor himself should make the first balances and the experiments that would be necessary to determine the correct proportions, etc., he evidently overlooked the fact that I have already determined all the general

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points and principles about it, required to enable any one to successfully construct them, and given full instructions derived from those experiments, in my paper. The only exceptions are the best curvature for the segments, and the best distance from the centre to place the compensating loads. But I stated that the result of my experiments showed that the circular form (or quadrants of a circle) would practically fulfill all the conditions as well as any other form. As to the other exception, I stated that "if the old diameter of the balance is to be retained," that is, when the diameter is already fixed by the construction of the movement, and experiments on that point are not allowable, "segments cut from a smaller rim must be used, and attached as near as possible to the centre." And in such cases the compensating load must also be placed at the farthest possible distance from the centre, so as to use as long segments as the space would admit of.

Hence, the only experiments now remaining to be made are to construct the balance so as to suit each style of movement to which they are applied. Different proportions are of course required for marine and pocket chronometers, and in watches the size and weight of the balance must be varied to suit the caliber of the movement, the proportions of the train, the strength of the motive force, etc., of each size or grade of watch. The main point to be ascertained in each case is the weight of the compensating load to produce a vibration proper for the movement—the hair spring being of course selected to suit the balance, not the balance altered to suit the spring. Any alterations of weight are easily made by the segment screws, or, in extreme cases, when the necessary weight would be too great for four segments to carry safely, then six should be used. This comprises all the experimenting required—every other point having been already settled by me or by the necessities and limitations of the movement itself—and these experiments are properly to be made by each maker, to conform the balance to his particular needs the same as he must now do with the ordinary balances to secure the correct proportions for them.

Not only have I done all that properly devolves upon me, but I offered to any one who feels practically interested in the matter the privilege of making and using any number of them that may be necessary to satisfy him of their value, free of charge. There is no difficulty in making them; still, if any watchmaker would like to test them, but hesitates to undertake it alone, my services and experience are at his disposal for the usual "four" wages.

I believe the principle of the balance to be the correct one, and that it will merit of as near an approximation to a perfect compensation as human eyes and hands are capable of executing, so that any shortcomings in practice will be entirely due to their inability, and not, as with other balances, to obstacles arising from faults in the principle of the balance itself.

During my correspondence with leading chronometer makers I have received very strong expressions of approval, and but one valid objection has been brought against my balance, viz.—That, from the number of parts fastened together by screws, a want of stability might be feared, from the parts working loose. But this objection is more apparent than real, because there is no necessity for having a single screwed joint in the whole balance. The "racks" on the arms are solid and fastened on the segments may as well be fastened by rivets as by screws. The blocks, etc., are, or may be made solid upon the arms, and the segments may be riveted directly to them. So this objection falls to the ground.

For my own part, I do not anticipate any trouble from that cause, for the reason that, all the parts in contact being of the

same metal, with no intervening layers of any other metal whatever, they must all expand and contract exactly alike, and would have no tendency to work loose if properly fastened together at first. But if the maker prefers that they should be riveted, he should first make an experimental balance with screws, etc., as described in my paper, to test the facility of making all alterations desired, and having fully adjusted this according to my instructions and ascertained the exact proportions, etc., proper for his style of movements, he could then make his subsequent balances with the blocks solid, without screws, and so beveled as to give the segments the proper inclination—fastening them temporarily at first, so as to admit of testing them and slightly altering the bevel, if necessary, before finally riveting them on, thus making all perfectly safe and sure—every part being either made solid or firmly riveted together.

And after the construction of his model balance he may, if he chooses, safely depend on the eye and hand of the workman for accuracy, in constructing others after that pattern, giving them no other adjustment than the usual manipulation of the screws in the rim, and still have a compensation far superior to that attainable with the ordinary balances, owing, firstly, to the proper arrangement of the segments for the purposes of compensation, and secondly, to the fact that slight imperfections in the construction are much less serious here than the same errors would be with the ordinary balances, a result which is also due to the arrangement of the segments.

One gentleman had the impression that my balance was designed to secure a correct compensation for middle temperatures, whereas that is one of its least important points. Its main objects and merits are two, viz:—To enlarge the range of compensation beyond what has been or can be done with other balances; so that what are extremes with many others are middle temperatures with this; and by securing a correct ratio, to obtain for all ordinary temperatures a closer compensation than can be got with other balances for middle temperatures—and this not by any special mechanical purpose but by its own natural operation.

I will conclude this subject, which is probably my last communication on this topic, by expressing my sincere thanks for the generous and hearty endorsement of my balance by the Horological Club, and my grateful appreciation of your highly complimentary remarks upon my humble efforts to set forth its peculiarities and advantages. Certainly, if my own experience is any criterion, inventors of horological improvements could not reasonably ask for a more friendly, disinterested or competent tribunal before which to bring the result of their studies and labors than your honorable body. There are doubtless scores of watchmakers throughout the country who could, if so disposed, broach discoveries and improvements quite as important as anything I have been able to offer, and it is to be hoped that they will take the slight trouble necessary to bring their ideas to the notice of the Club, and give the whole trade the advantage of whatever is really new and valuable. They will receive at least as much in return as they give to the rest, besides being benefited with the rest by the raising of the business in the estimation of the public, by the increased intelligence, capacity and self respect of the main body of those who follow it, resulting from the dissemination of new ideas, processes and improvements of all kinds.

As to the compensation balance of one metal, spoken of, I presume it can be done. I once undertook it myself, but finding that the combination of two metals in the usual way was more simple and reliable, as easily made, and acted much more rapidly, I abandoned the idea. But let us have the trial and all other new ideas that are brought forward, let them be fully and fairly discussed, and then let the best man win.

To those who are seeking a perfect compensation pendulum, I would suggest the application of adjustable compensating segments would seem to offer a simple, convenient, inexpensive and reasonably

(Continued on Page 62)

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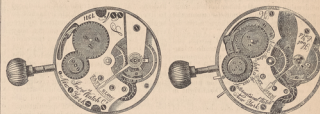
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(Continued from Page 30.)

certain means of securing that end, even with pendulums of very simple construction. I cannot see why even the ordinary wooden rod with a single-metal ball might not be perfectly compensated in this way, having one segment, with its weight, on each side of the balance. I can easily see I should think the idea worthy of a careful and thorough trial, and would like to see an account of the results in the *Jeweler's Circular*.

Your request for the statistics of spring breakages reminds me of my own efforts to solve that problem. The manner in which they are caused is really wonderful. There is, to be sure, nothing strange in the common case of springs breaking at the central coil, or near it, as that is caused by the short bend across a hub on the winding arbor much smaller than the arbor around which it was coiled when it was made, and all careful watchmakers immediately draw the temper of the inner coil or two in such cases when fitting in a new spring; also when the hub is too large for the central coil, and there is something strange in the majority of cases except that they should break at all while under a straight forward pull, when the spring may be broken by a pull which is twisted into all sorts of knots and curves without injury.

But it is nothing less than wonderful to see every coil of a spring breaking in a straight line from the centre outward, with a uniform space between the broken ends, forming an open passage through the coils, with the ends of the coils really as evenly disposed as they could be placed by hand. No doubt all the coils break simultaneously, and the pieces fly outward against the walls of the case, and really rel, retaining their position there by the outward pressure of their ends.

But why should a fracture through all the coils occur? If the spring is really very long, it might be thought that it caused a short kink or bend in the inner coil when wound tightly, which, being transmitted through the rest of the coils, cause a similar tendency in all of them to break at that place.

But that can hardly be the reason, for I do not know that they found a spring which had broken at those points over the end of the hook, although, no doubt, they do sometimes break there, as well as at other places. Another proof that it is not the cause is that we find cases where the coils have broken in *two* such radial lines. In my experience, these two places have generally been near together, and while one set of pieces was long enough to stand up in their places, the other set was short and they were found loose and mixed up.

But, on setting them up on a stand, against the outer wall of the barrel, in the order of their length, two uniform passages could be seen extending through all the coils.

Another proof is in the fact that the passage through the coils is not always of the same width. If the spring is broken, the fracture probably occurred when the spring was wound closely around the hub, and the coils were then small; but when we come to rest against the end of the barrel the pieces were much too short for the increased circumference at that place, causing an interval between the ends of each piece. So when the passage is narrow, the circumference of the coils at the time of the fracture was not much smaller than at the outside of the barrel, and we infer that the spring must have been partly unwound, although the coils were probably still in contact.

Still more curious is the case when every coil is broken, and the ends of the pieces are at a nearly uniform distance apart, *not so far apart* that they overlap each other and prevent the formation of any passage, but so arranged these pieces in the barrel I have found that a passage could be formed, showing that the fractures occurred in a radial line, as also that the ends of all the coils did not break at the exact instant; probably the outer coil broke first, and before the end of the spring had slipped very far the rest of the coils broke, and so on. If this supposition is correct, the fractures, although not occurring simultaneously, must have done so in an almost infinitesimal space of time, for we know

that it does not take long for a broken spring to unwind. It follows, also, that there must have been some effect produced on the coils, and those of the outer coils in this radial line when wound up, because that effect remained and caused the fractures to take place at those points even after they had been unwound, and with each other, from the partial unwinding of the spring before breaking.

What is the cause of a fracture in a radial line? It cannot be a radial spring? It cannot be overwinding; it can hardly be a change of temperature, or any similar influence, for it would not produce a fracture that is so evenly disposed in the spring, or injuries received in making or handling it, as they could not occur with the requisite regularity; it cannot be admitted that this influence is also a cause of fracture. But my observation is opposed to this supposition. It seems certain, however, that these breaks and the spells are altogether distinct phenomena, although they occur together, and that an explanation of the former will not account for the latter, and it is probably very difficult to discover the cause of the former, it seems to me that the cause of spells may be found by simple observations, and it seems to be capable of being making, if we can get enough of them to enable us to discern the general law that prevails through all.

It is a very common spring breaking is a phenomenon known to all watchmakers, and when a freshly broken spring comes in they make up their mouths for a "few minutes of the watch," and then they wonder what whatever caused that break probably caused many more at the same time. Three or four is a common number for a spell, I have had ten—probably shops that have a very large run of work often receive many more than that. And all of these springs, scattered over a wide country, have broken on the same day and about the same hour. If workmen would take the trouble to inquire the time of the breaking, they would be astonished to find how nearly simultaneous they often are. Generally the hands of the watch show the hour, but even if they have been changed, one can recollect near enough.

Of course there will be scattering breaks, but I refer now to the well defined spell. Some cases occur within a day or two of each other—again there will be an interval of several weeks, during which no spell will occur, except that one could be traced to accident or force. What is this powerful, wide spreading, intermittent influence, which is the cause of spells?

It is a return can hardly be called periodic—at least I have never been able to notice any regularity or system in the recurring periods; they do not even occur at the same hours of the day—although I have found them most frequent about nine o'clock in the evening, and from four to six in the morning.

It is not surprising that the fact that most people wind their watches about those times. No doubt the breakage of a spring is connected in some way with the strain upon it, and it is not surprising that a mainspring breaking when allowed its full dimensions. But in the barrel it is under constant strain. Even when entirely run down, it is artificially compressed. Although there is no direct traction upon it, it is forcibly restrained from straightening out naturally, and in some cheap watches springs break when entirely run down as well as at other times.

But the liability to break in this manner is caused by the influence of the actual break must be some wide-spread influence, as shown by the spells. It is a change of temperature, or some electrical or magnetic influence in the atmosphere or the earth? I undertook to settle that in a number of years ago, I think it was 1864 or 1865. I kept a sheet of paper on the wall, and when a watch or broken spring came in I made a minute inquiry into all the circumstances, and noted them down; as, the day and hour of the breaking, the position of the watch, whether wound, or how long after it was wound in the usual hour, or if there had been any unusual treatment or exposure for a day or two previous; and finally if there was any

change of weather or temperature at the time or shortly before.

In about every instance I found the spell accompanied by some change, often slight, but still a change. But at last there was a "spell" when neither my customers nor myself could find any change of weather that was one mischance. It was in the summer or fall, and for several days there had been a dead level of sultry weather; the temperature scarcely varied a degree, and there was no air stirring—in fact, the liveliest ingenuity failed to discover or suggest any meteorological phenomenon worthy of notice. I thereupon concluded that it was one mischance. It was "no fellow can understand," or at least it was too recalcitrant for my unskilled powers to unravel, and I stopped it altogether. Possibly I was too hasty—for perhaps some spells are caused by a change of temperature—while others have a different cause. But in those days they did not have a Signal Office with its stations every where, observing and recording "storm centres," cold waves, electrical disturbances, and the like, and I was not a watchmaker, watch and air. Nor had we any *Jeweler's Circular*, through which watchmakers could communicate and send in their observations, and so depend entirely on his own observations.

But the Signal Service is now so systematized, thorough and extended, and the records made by it and other agencies are so complete, that it seems to me it is entirely practicable to discover the cause of spells by the collection of a mass of statistics as proposed by the Club, to be compared with the Signal Office Records. If it is connected with a change of temperature, electrical waves, or disturbances of the regular earth currents, or any similar phenomenon, no better way of detecting it could well be devised. And I for one will willingly contribute all the figures I can gather.

But if one who is not a member of the Club might take the liberty to offer an amendment to your proposition, I would suggest that, in addition to the records of the Signal Office, the watchmakers be requested to keep a record of current breakages, stating simply the day and hour of breaking; how near wound up the watch was at the time, and in what condition; and any change of weather or temperature noticed *there* at about that time. Merely number the watches—the pieces of course it is not necessary.

These records should be forwarded to the Club every month or two, and if it be at all possible to discover the cause of spells, it ought to be done by means of a mass of such records. If the cause is discovered, some safeguard or preventive will be next in order. And if mainsprings can be so great extent protected from breaking, so can other springs and articles of steel. The object is certainly important enough to deserve and secure the general cooperation of any watchmaker everywhere. It need not take over one minute to write down all the items I have mentioned.

And aside from the general importance of the subject, it will be found to pay as a matter of self-interest. As the watch comes in growing, and wondering why watchmakers don't put in good springs, so they don't break, and going through the motions of the rigid, and the watchmaker on such occasions, the above inquiries, accompanied by a brief explanation of their value, will give a very different tone to his thoughts. He will then see that the watchmaker is no more to blame for the breakage than he is, and will become interested in the subject as a matter of self-interest which will be impressed upon his mind in connection with it, will reconcile him to his misgivings, and will induce him to do it not owing to any fault of the spring or the workman, but to the operation of some unknown law of Nature—some unexplained cause, and which he cannot control. In short, if he can stand such a suggestion, that without flinching, and still blame the watchmaker, he must be made of sterner stuff than the rest of the time.

Let us suppose some men of being longer-sighted than other men, I will close.

OSKONIA, N. Y., March 1st, 1874.

FINE 18 KARAT WATCH CASES,

Manufactured by **ROBBINS & APPLETON,**
For American Waltham Watches,
 No. 1 BOND STREET, NEW YORK.



200



542



Prompt and careful attention given to SPECIAL DESIGNS for
 PRESENTATION PURPOSES.



193



564



537



197



194



The above is a fac-simile of our certificate, which accompanies every 18 karat Case of our manufacture, and is as valid a guarantee as the stamp of the Philadelphia Mint.



199



190



568



186

The above engravings are a few examples of Decorated work executed by us from original designs. The number under each cut corresponds with those registered in our book of designs, and can be referred to when ordering.

We are prepared to execute orders for cases in any quality of gold, embracing an unlimited variety of designs, unexcelled for beauty, originality and superior workmanship.

Remarkable Novelties in Cold Jewelry.

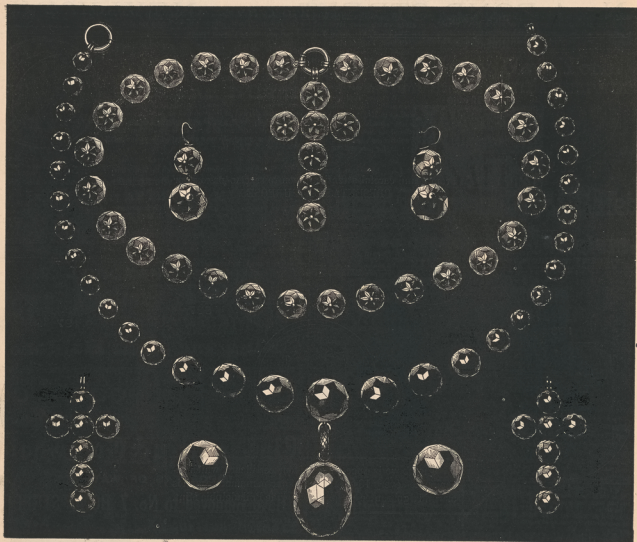
It seems, as each new season comes, as though the possibilities for novelties have been fairly exhausted, and that nothing is left but to reproduce over and over again the styles that have caught the public taste in the past. Yet, as there is practically no limit to the new ways in which words can be put together, though libraries are over-crowded by the hundred thousand, so gold and silver and precious stones admit of infinite combinations under the artistic invention of the designers. This year again there are novelties both in designs and in styles, and fashion in

jewelry shows many important changes. The passion for everything oriental in dress revives the taste for colored stones, which find ready sale. Opals continue in great favor, especially the clear, long oval shaped stones. Trefoil rings are set with rubies and diamonds; another favorite style is in three scrolls, of sapphires, rubies and diamonds. Diamonds are still altogether preferred for engagement rings—for the most costly sacrifice must be laid upon Cupid's altar at this hey-day of bliss.

A new fashion in sets of pendants and earrings has paintings upon the gold itself, instead of on porcelain. One of these we have noticed is adorned with three exquis-

ite heads of the Medici, framed in square settings of Etruscan gold; another has devices of Cupids, flowers and music scrolls, also set in Etruscan gold, of crescent shape, with a square bar below, whence drops a fringe of large pearls. A beautiful and unique pendant is formed of colored opaque pearls of various shapes gathered together like a bunch of grapes, a pear-shaped pearl falling below. The pearls are of various lovely shades, gray, bluish, plum color, and small diamonds are interspersed among them. Bars, enamelled in black, and connected by a large diamond between each, make a handsome new style of necklace.

But the chief novelty of the current year is the new style facet jewelry, introduced by Messrs. Smilie, Dorrance & Edge, to whose courtesy we are indebted for some illustrations of these goods herewith. This house has a happy genius for novelties, for it is known to the trade as the manufacturers of the woven fabric gold chains, which have made so general a hit. The new goods, so far as they have been introduced to the public, have been quite as well received. The invention is very ingenious, and is one of those happy devices that every one wonders no one has thought of before—the best assurance of popularity. The idea is to present bur-



ished faces of the gold object in every direction, so that wherever the wearer is standing or in whatever light, there will be the same flash that marks the well-cut diamond. It is therefore the most brilliant jewelry that has ever been made in gold. Each knob of gold, as they may be called, is cut after the model for a large diamond, and the effect of their combination, especially in a well-lighted room, so that the reflections are many, is really dazzling. The well-known laws of the interference of light operate in some of these combinations of reflecting surfaces to give almost the play of prismatic hues, in their lovely colors, that distinguishes the diamond itself.

Still another and even more brilliant ef-

fect is obtained in some of these goods by cutting into the upper surfaces of these knobs the shape of a star. This is cut deep enough to admit of a minute ball of gold being set in the centre of the star, so that it stands out in relief with a peculiarly rich effect. A process has been invented by means of which these interior surfaces, as they may be designated, may be lapped bright, and thus the play of light increased, and the globe of gold made to stand out still more boldly, as beautiful as a precious stone. All of these goods are made in red gold, from 14 karats up, but the manufacturers have hit upon the modification of making the globe in green gold, which still further heightens the remarkable effects of color displayed in all these beautiful goods.

The facet jewelry is made in a wide va-

riety of goods. The crosses are particularly beautiful; the larger sizes, with the star cuttings and globules in relief, are the most brilliant articles in gold jewelry that a lady can wear as a pendant. The smaller sizes are very neat and elegant. Lockets and a pretty variety of charms are also made in this style. For neck chains, these brilliant knobs are strung on the beautiful woven fabric gold chains manufactured by this house, and we have known them, seen casually, to deceive admirers of fine jewelry into wondering at the exorbitant value of a chain strung with "such magnificent stones." Earrings of these goods are also in the market, and there is a variety of other applications of the facet jewelry too numerous to schedule. We may mention, however, the application of facet work to watch centres, which are

cut on the lathe. The American Watch Co. have introduced this improvement in their popular and elegant cases, with admirable effect.

The trade is indebted to Messrs. Smilie, Dorrance & Edge for a novelty of great ingenuity, beauty and attractiveness, that is likely to be permanently popular. This invention certainly imparts to plain jewelry a brilliancy it never had before. It is quite impossible to present any adequate description by the pen, and even the engraver finds it difficult to realize the effect to the reader; we should advise those of the trade who have not seen this welcome novelty to order samples at once, when they are sure to stock up in it. No novelty that has recently been introduced seems to us to promise more permanence in its hold upon the public taste.

SPRING TRADE, 1875.

AIKIN, LAMBERT & CO.,**Nos. 14 & 16 Maiden Lane, New York.****Choice
Gold Pens.**

Have in stock, and are manufacturing a large assortment of first-class Gold Pens, consisting of long nibs, short nibs, fine pointed, coarse pointed and angular or oblique pens. All of which will be furnished with soft, springy, or hard temper as may be required.

**Assortments
Show Cases.**

Assortments arranged in handsome trays, and pen signs furnished to regular agents. Being disposed to meet liberality with liberality we have originated and gotten up Metal Show Cases of sizes suitable to the wants of our patrons who order sufficient goods to make a creditable display. Others are compelled now to follow our lead, acknowledging us as "Leaders of Fashion."

Rich Jewelry.

We are also manufacturers and dealers in solid gold and rolled plate jewelry all of which being intended for the Jewelry Trade, proper will be found reliable.

Rings.

Diamond, Amethyst, Topaz, Pearl and Stone Cameo Rings.
Chased, Engraved and plain Band Rings.
Sold 18kt. and 14kt. plain Rings.
Filled Rings of all new styles.

Chains.

Vest, guard, and other styles of Gold Chains.
Gold Sets, Pins, Cuff Buttons, Studs, Ladies' and Gents' Jewelry.
New goods sent on selection when required.

Paul Breton

*Perfect.
Reliable.
Excellent.*

Watches have been introduced for some 10 years and numbers of them have been sold. By inviting criticisms from the several master-minds in America, as well as in Europe, we have now a watch perfect in its proportions, reliable in its action, made of the best materials, and in short, the best watch for the money offered for sale; energetic competitors will endeavor to force their goods that the Paul Breton's may be displaced, but the testimony of those who have experimented is, that for assured continued excellence the Paul Breton is the watch.

Montandon Freres,

*Something
New.*

of Lauch, have just sent out an invoice of their movements, gotten up under our direction, with *Estell's Patent Regulator and Patent Safety Barrel*. Something entirely new.

Chas. Lafour Standard Watches.

are three quarter-plate in style and full-jeweled; have tempered hairsprings; good balances, and are Standard Watches at low prices. Will have dial, hands, eyerings, etc., for repairs.

Gold Cases

As well as Silver Cases made to order. Those desiring best gold, and the height of style, will please communicate with us.

One Ladies' Case for Four Different Movements.

We make the patent "compromise cap" to our ladies cases, by which the same case can be used for the Elgin, Waltham, Lafour, or Longine movements.

Dealers in this city are requested to call and introduce themselves. Those desiring to write us will address

AIKIN, LAMBERT & CO.,**14 & 16 MAIDEN LANE.****NEW YORK.**

JAMES C. AIKIN.
HENRY A. LAMBERT.
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JOHN E. SEAR.

RINGS A SPECIALTY.*To the Retail Jewelry Trade.*

So general is the present business depression, that it is not reasonable to suppose that the sale of the smaller and less expensive articles of jewelry, will for some time to come be much larger than usual. You can have nothing more staple or sure of sale at a fair profit, than a well-assorted stock of moderate priced Gold Rings. For 30 years we have made a constantly increasing variety of *Hard Solder Rings*, which we have always warranted, and which have never disappointed any purchaser. The market has lately been flooded with cheap plated hard solder and low karat Solid Rings, which many jobbers have preferred to sell you instead of ours, because they could make a larger profit on them. The result has been, in many cases, that the retailer has become disgusted with all hard solder rings, and no longer keeps a respectable stock of them.

We want you to know that we still make nearly 600 patterns of hard solder rings, of every variety of style for men, women and children, that they are struck from 18 karat stock with 10 karat linings, and put together with solder that is 90 per cent, coin silver, and that every ring is as well finished as the best Diamond work. They are all stamped and warranted to give entire satisfaction, and we ask of you to make a trial of them, assuring you that they are the *best hard-solder ring yet made*, and evidently appealing to scores of the most careful dealers in the country for confirmation of our assertions.

We also offer a long line of solid 14 karat Cameos, Amethyst, Coral, Roman Enamelled and Engraved sets, together with many other goods in our line, as low as any other Manufacturers in the land. Respectfully, **RAYANT & BENTLEY, Manufacturing Jewelers, 13 Maiden Lane, New York.**
January, 1875.

SMILLIE, DORRANCE & EDGE,**Manufacturing Jewelers,****No. 5 Maiden Lane, New York,****Manufacturers of Chain Bracelets,**

Necklaces, Opera Chains, etc., from their New Woven

Fabric Chain, 14 and 18 kt. only.

SPADONE, ROOD & CO.

MANUFACTURERS OF

Fine Jewelry & Gold Chains

IMPORTERS OF WATCHES.

Have Removed to No. 7 BOND STREET,**New York.**A. SPADONE,
CHAS. D. ROOD,
BROS. F. SMITH.

Factory, Jersey City.

Specialties, Chain & Band Bracelets & Opera Chains**BALL & BARNARD,**

MANUFACTURERS OF

**Band Bracelets,**

OF ALL DESCRIPTIONS,

Colored, Enamelled, Engraved and Ornament &c.

All of our BRACELETS have our PATENT SAFETY GUARDS, which is a new and useful improvement.

Office No. 9 JOHN STREET,**Factory, Newark, N. J.****NEW YORK.**

The Elegant 18k. Gold and Coin Silver

WATCH CASES!

MANUFACTURED BY THE

Dueber Watch Case Manufacturing Company,

Are made with a view of meeting the requirements of

A FIRST CLASS RETAIL TRADE.

They are Carefully Made, Well Finished and Warranted as Stamped,

AND HAVE NO SUPERIOR.

No. 131 West Fourth Street, Cincinnati.

No. 19 John Street, New York.

"ILLINOIS" SPRINGFIELD WATCH CO.



These movements are all full plate, 18 size; have sunk second dials, exposed pallets, and have cut balances (except the "Mason," which is half cut). All balance pivots are conical, and hair springs finely tempered.



For sale by all the principal Jobbers in the United States.

Price Lists and Circulars furnished on application with business card.

Manufactured by the Springfield Watch Co.,
SPRINGFIELD, ILL.



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Springfield, Illinois,

AND

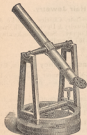
11 Maiden Lane, New York.

REDUCTION IN PRICES

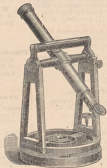
OF

John Bliss & Co's Transit Instruments,

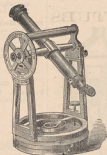
FOR OBTAINING CORRECT TIME.



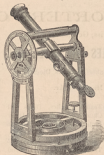
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NO. 8.



NO. 10.



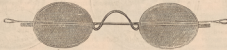
Marine Chronometers.

IMPORTANT NOTICE.—These Transits are really set in position without the aid of strictly correct time as a basis for that purpose. Printed instructions, easily understood, accompany each instrument, and as calculations are required, preliminary to setting in position. As a trial only is required to insure unqualified approval, we are inclined to make the following **LIBERAL OFFER.**—On receipt by us of satisfactory reference, and 10 per cent. of the price, we will send one of the foregoing Transit Instruments, on hire or trial, for one month, with full printed instructions for setting up and using the same, and if purchased after trial, we will allow the hire to be applied in part payment, on 1 cent the instrument on approved note at four months for the balance. Special terms for payment by installments, after trial, on application. We do not make this offer merely to hire these instruments, but to insure a trial with a view to sales, the hire received being only sufficient to cover the cost of repolishing in case they are returned. Send for Illustrated Circular giving full description.

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**SILVER HEADED
WALKING CANES,**

Office and Factory.

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NEW YORK.****FRASSE & CO.**

SUCCESSORS TO W. H. FRASSE.)

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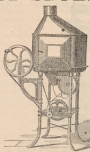
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And Neck Chains Specialties.

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Importers of FINE WATCHES and MOVEMENTS.

WATCH CASE MANUFACTURERS,

SOLE AGENTS FOR

**H. L. MATHEY'S Watches**

Trade Mark. Which we have in all varieties, such as independent 4, 1-4 and split seconds, chronographs, minute repeaters, etc., in key and stem winders.

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DAVID F. CONOVER & CO.

(Successors to WM. B. WARNE & CO.)

Importers, Manufacturers and Wholesale Dealers in

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S. E. Corner Chestnut & 7th Sts.,

(FIRST FLOOR.)

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SUPERIOR****COMPANY,
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KEY AND STEM WINDING AND SETTING

For LADIES and GENTLEMEN.

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We keep a full line of these
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also, Quarter-Seconds, Chrono-
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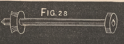
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Translated for The Jeweler's Circular,
BY A. REHOB.

The Cylinder's Equipment, Practical Details.

POLISHING THE LIPS OF A CYLINDER WHEN THEY ARE WORKED OUT.

If the cylinder is not cut too deep, we can repolish the lips with two ruby files. One coarse and one fine are used for this purpose. These lips must be very well polished, and in such cases we must also repolish the inclines of the wheel. To repolish the lips of a cylinder, we fasten it with wax by its balance on the end of a hollow wire such as shown in Fig. 29, only without the collet, and the



shoulder on the other end is thinner. To repolish the small lip, put the cylinder in first, and with it, having first filed off half of the diameter of the wire, which leaves open the cut part of the cylinder.

STRAIGHTENING A CYLINDER.

Cylinders are generally bent at the column and we will give two good methods for straightening them.

1st. Remove the lower plug, and put in a new one. Make your cylinder to run true by throwing the centre a little on one side with a file and then make your pivot without paying any attention to the small cannon which will be no longer true.

2d. If both pivots are broken and the cylinder bent, remove the two plugs. Take an arbor very smooth and cylindrical, fitting in the straight part of the cylinder. Put the cylinder in a brass collet covering and touching well the exterior face of the rests. Put the column of the cylinder in contact with a heated wire, and the moment it is blue, carefully put your arbor in the cylinder, and holding it firmly with a pair of pliers one jaw touching the arbor and the other the column, immerse the whole in water until cold. Then make the plugs anew.

REPLACING A BROKEN PLUG.

A broken pivot in the cylinder necessitates the replacing of the whole plug, which is done in the following manner: take a piece of brass with a hole large enough to admit freely the shoulder of the plug, and bevel the hole as shown in B, Fig. 29, so that only the side of the cannon will touch. With the plug driver A, just start the plug, and then take the riveting stake, put the cylinder on it in a hole which will just admit the plug, and drive it out. Then make a new plug in the same way as was shown for a new cylinder.

Some will put the cylinder in wax, and drill a small hole through the old plug and put a new pivot only, but this method is good only in very few cases, and is generally preferable to make the whole plug anew.

A TOOTH TOO WIDE FROM THE BACK.

With teeth too wide, the back of which is not enough beveled, the two points, O and A, Fig. 29, will sometimes touch the



cylinder at the same time. We would

then have a very extended vibration, and an occasional stopping of the watch. This defect is remedied by filing the back of the tooth as shown by the dotted line M. If the column comes as far as O, then a part of it must be removed in the operation.

REPLACING A CYLINDER SCAPE WHEEL PINION.

The following is one of the best methods to find the measure for the proper height of a cylinder scape wheel pinion.

We put, in the hollow of the escapement, a disc of brass opened in the centre, on which we put the wheel. The cylinder being in its place, we file this piece of brass until the wheel stands to the proper height for the pinion. The distance from the top of that disc to the face of the lower jewel shows the length of the pinion, from the seat for the wheel to the shoulder of the lower pivot.

Or take a disc of brass about the thickness of the arms of an ordinary scape wheel, shape it as in A, Fig. 30, and put it in the hollow for the scape wheel, on the plate of the watch. In this place there are three screws, two resting in the scape wheel hollow, and the other, which is longer, rests in the 4th wheel hollow. By turning these screws, we will bring that disc to the position the wheel would occupy, and in such a way that the part D of it will be just in the centre of the small cut of the cylinder. Then with a small rule cut as in H, which will rest against the face of the lower jewel, we take the measure from the top of the disc to the lower jewel and mark it carefully on the pinion. Now put the scape wheel bridge in its place, and again measure very carefully the distance between the two jewels, which gives the extreme length of the pinion less the pivots. If we have been careful in taking these measures, we will have no trouble in finishing the pinion.

Some workmen finish the pinion completely before riveting the wheel on it, they use a very strong screw or a brass collet having only two screws one opposite the other which holds the pinions by the leaves, or again simply a brass collet hollowed on each side, and they wax the pinion in it.

Others will first make the rivet and the top pivot, then will rivet the wheel, and cement it on a small collet as shown in F, Fig. 31, and then finish the lower pivot.

Fig. 31



Care must be taken to use a very weak bow and fine hair, otherwise there would be danger of breaking the pivots.

TO FIND THE STRENGTH OF A HAIR SPRING.

To this effect, the watchmaker must have a "regulating balance," that is, one out of an old watch, regulated say at 18,000, take the hair spring, balance, etc., and put up the whole on a plate as P is put up on the plate A C D E, Fig. 31. Being sure that this regulating balance is free and has oil to its pivots, we proceed thus: the new hair spring we want to put in the watch under repair being fastened on the balance, we hold the hair spring by the outer coil with a pair of tweezers, and resting the lower pivot on the plate, A C D E, two arms of the balance opposite each other as shown in P A, we set both balances in motion.

With a little practice, we will soon find out if the new hair spring is the proper strength or not, and when the two balances vibrate together, the point between the tweezers goes between the regulator

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pins if they are very close together, or it is the proper point to pin it in the stud it the two regulator pins are a little wide apart.

It would be a very useful thing for watch makers, if in their leisure time, they would take old watch movements having different leas, and prepare them as has been said; half dozen plates thus prepared, and each engraved according to the number of vibrations it makes in one hour, would pay well for the trouble of making them.

[This finishes our selections from the chapter on the Cylinder Escapement, in Saurin's voluminous work. Those of our readers who have read them carefully from the beginning will have doubtless found much food for reflection. Other chapters will be published as soon as the necessary arrangements are completed for their translation and the reproduction of the wood cuts.—C.R.]

Hints to Watchmakers.

ENAMELS.

An Enamel is a species of vitreous varnish, colored with metallic oxides, applied in a thin stratum to brightly polished metallic surfaces (copper or gold), on which it is fixed by the flame of a lamp urged by the blowpipes, or by the heat of a small furnace.

FLATS, OR WHITE FLUX.

The basis of all enamels is a highly transparent and fusible glass, called *Flux*, or *Paste*, which readily receives a color on the addition of metallic oxides. It may be made by one or other of the following formulae:—

No. 1.—Red lead, 16 parts; calcined borax, 3 parts; powdered flint glass, 12 parts; powdered flints, 4 parts; fuse in a Hessian crucible for 12 hours, then pour it out into water, and reduce it to a powder in a biscuit-ware mortar.

No. 2.—Tin 3 parts; lead 10 parts; mix, calcine in an iron pot at a dull cherry-red heat, and scrape off the oxide as it forms, observing to obtain it quite free from undecomposed metal; then reduce it to fine powder by grinding and elutriation. In this state it is known among enamellers as *Flux*, or *Calcine*. 4 parts of this calcine are next mixed with an equal weight of pure sand or powdered flints, and 1 part of sea salt, or other alkaline matter; the mixture is then partially fused in a Hessian crucible, by which it undergoes semi-vitrification.

No. 3. (Chaptal).—Lead and tin equal parts; calcine as above, and take of the mixed oxides or calcine and ground flints of each, 1 part; pure carbonate of potash, 2 parts; and proceed as before.

No. 4. (Wynm).—Flint glass 3 oz; red lead 1 oz; as last.

No. 5. (Wynm). Red lead 18 parts, borax (not calcined), 11 parts; flint glass 16 parts; as last.

No. 6. (Wynm).—Powdered flints 10 parts; nitre and white arsenic, of each, 1 part; as last.

The precise qualities of the products of the above processes depend greatly upon the duration and degree of heat employed. By increasing the quantity of sand, glass, or flux, the enamel is rendered more fusible, and the opacity and whiteness is increased by the addition of oxide of tin. The use of borax should be avoided, or it should be used sparingly, as it is apt to make the enamel effloresce and lose color.

BLACK ENAMEL.

No. 1.—Calcined iron (protoxide), 12 parts; mix, and add an equal weight of white flux, and fuse as before.

No. 2. (Clout).—Pure clay 2 parts; protoxide of iron 1 part. A fine black No. 3.—Peroxide of manganese 3 parts; saffre 1 part; mix and add it, as required, to white flux.

BLUE ENAMEL.

No. 1.—White frit or flux, colored with oxide of cobalt.

No. 2.—Sand, red lead and nitre, of each, 10 parts; flint glass or ground flints, 20 parts; oxide of cobalt 1 part, more or less, depending on the desired depth of color.

BROWN ENAMEL.

No. 1.—Manganese 5 parts; red lead 16 parts; flint powder 8 parts; as before.

No. 2. (Wynm).—Manganese 9 parts; red lead 14 parts; flint powder 16 parts.

No. 3.—Red lead and calcined iron, of each 1 part; antimony, litharge and sand, of each 2 parts. To be added in any required proportion to white frit, according to the color desired. A little oxide of cobalt or saffre is frequently added to alter the shade.

GREEN ENAMEL.

No. 1.—Flux or frit 2 lb; black oxide of copper 1 oz; as before.

No. 2.—As the last, but adding red oxide of iron, 3 dr. Less desirable.

No. 3.—Copper 4 oz and litharge of each 2 oz; nitre 1 oz; sand 4 oz; flux or frit according to color wanted.

No. 4.—From transparent frit, any quantity; oxide of chromium enough, of each 1 part; Color superb; it will stand a great heat, in common hands however, it frequently turns on the dead leaf tint.

No. 5.—Transparent flux 3 oz; black oxide of copper 20 to 40 grs; oxide of chromium 2 grs. Resembles the emerald.

No. 6.—From blue and yellow enamel in the required proportions.

OLIVE ENAMEL.

Blue enamel 2 parts; black and yellow enamel, of each 1 part. See brown enamel.

ORANGE ENAMEL.

No. 1.—Red lead 12 parts; red sulphate of iron and oxide of antimony, of each 1 part; flint powder 3 parts; calcine together, powder, and melt with flux, 50 parts.

No. 2. (Wynm).—Red lead 12 parts; oxide of antimony, 4 parts; flint powder 3 parts; red sulphate of iron 1 part; calcine, then add flux 5 parts, to every 2 parts of this mixture.

PURPLE ENAMEL.

No. 1.—Flux or frit, colored with oxide of gold, purple precipitate of cassius, or peroxide of manganese.

No. 2.—Sulphur, nitre, green vitriol, antimony, and oxide of tin, of each 1 lb; red lead 50 lb; mix, fuse, cool, powder and add rose copper, (red oxide), 19 oz; saffre 1 oz, crocus marts 14 oz; borax 3 oz; and of a compound formed of gold, silver and mercury, 1 lb; fuse, stirring the melted mass with a copper rod all the time, then place it in crucibles, and submit them to the action of a reverberatory furnace for 24 hours. This is said to be the purple enamel used in the mosaic pictures in St. Peter's at Rome. To be Continued.

Sun Dials.

The difficulty with ordinary horizontal sun-dials is that, in consequence of the penumbral shadow of the style, or pin, they can scarcely ever give the time within three minutes, even when they are carefully constructed and accurately set. A means of avoiding this objection is now resorted to successfully by a dial so constructed that it may be set in the meridian and truly horizontal. The circle of the dial has towards its south point a fine needle about three inches long, whose two hairs proceed, one in a fixed position, parallel to the earth's axis at the place—this being supported by a stout brass arch, which can be shortened or lengthened, and which has a fine slit at its upper part to hold the fixed hair. The shadow of this hair is always sharp and well defined from about three inches of the needle, round which a small hour-circle of about that diameter is graduated. The floating hair, as it is called, being taken by the hand and laid along the shadow of the fixed hair so as to bisect it where it is sharp, is stretched out to an outer graduated hour-circle, which the induction can be easily read off to a fraction of a minute.

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Finger Rings.

Among the Italians of the fifteenth and sixteenth centuries it was usual for ladies to give their lovers rings which contained their portraits, and were made with the *fose* or two hands clasped. It was usual also for lovers to wear the rings given to them by their mistresses on holidays, as we find in 'England's Hellion' (1600)—

"My songs they be of Clith's prayre,
I wear her rings on holy dayes."

Bassanio and Gratiano give the rings which they received respectively from Portia and Nerissa to the young doctor and his clerk after the discomfiture of Shylock, although Portia had said—

"This house, these servants, and this same myself: Are yours my lord: I give them with this ring—Which when you part from, lose, or give away, Let it procure the ruin of your love, And be my vantage to exclaim on you."

And Bassanio had answered—

"When that ring Parted from this finger, then parts life from hence: O, that he had to say, Bassanio's death!"

Imogen gives her husband Posthumus a ring when they part, and he gives her a bracelet in exchange. "Although," he says, "my ring I hold dear as my finger, 'tis part of it; 'yet he gives it up to let Imogen to test the virtue of his wife. In Beaumont and Fletcher's 'Cupid's Revenge,' a lady describes a man's presents to his mistress—

"Given earrings we will wear!
Baskets of our lovers' hair,
Which they on our arms shall twist,
With their names carved on a ring."

Sometimes the man gave a ring to his lady. In Davison's 'Rhapsody' (1611) there is a sonnet from one who sent his mistress a gold ring with the pure 'puro and endless'; and when Richard III. brings his rapid wooing to a conclusion, he gives Lady Anne a ring, saying—

"Look how this ring encompasseth thy finger,
Even so thy breast encompasseth my poor heart;
Wear both them, for both of them are thine."

In Spain the gift of a ring is looked upon as a promise of marriage, and is considered sufficient proof to enable a girl to claim her husband. In the fifteenth century love rings occur with the *oprine* (*Telephium*), commonly called *Midsummer men*, engraved upon them, a device which was chosen because the bending leaves of that plant are presumed to prognosticate whether love was true or false. It was used for love divination late into the last century.

The gimmel, gimmel, gimmel, or gimmel ring, was a pretty invention which continued a favorite for many years. It was a twin or double ring, and took its name from the word *gimmel*. Sometimes it was formed of three pieces of gold wire and even four occasionally, in the latter case the result was a puzzle ring.

"Thou shalt not me a true-love knot; but I return a ring of *jimmies*, to imply Thy love had a knot, mine *jimmies* have."
—Herriot.

At first it was a simple love token, but afterwards was converted into a ring of affiance; the lover putting his finger through one of the hoops and his mistress hers through the other.

"A curious artist wrought 'em
With joints so close as not to be parted;
Yet are they both each other's counterpart;
Her part has John Inscrub's and his had Zephia
(You know those names were thine) and in the middle
A heart divided in two halves was placed.
Now if the rivets of those rings included
Fit not each other, I have found it this way;
But if they join, you must forever part."
—Dryden's 'Don Sebastian.'

Mr. Crofton Croker in his privately-printed catalogue of Lady Londesborough's collection, describes and figures a

very interesting funeral ring, consisting of three rings, which separate and turn on a pivot. The two outer ones were united by two clasped hands which concealed two initial letters upon the middle one, which was toothed at the edge. The following is the account given of the use to which the ring had been put:—

"There can be little doubt from the specimens which have come under observation, that it had been used as a betrothing ring by an officer of the king's German legion with some Irish lady, and that the betrothed ring was retained by some confidential female friend, who was present as a witness at the betrothal ceremony—usually one of the most solemn and private character—and of which, even the Holy Bible, passed before the witness, both the man and the woman swore away the upper and lower rings from the centre one, which was held by the intermediate person. It would appear that the parties were subsequently married; when it was used, as a proof that their pledges had been fulfilled, to return to the witness or witnesses to their contract the two rings which the betrothed had respectively worn until married, and thus the three rings, which had been separated, became reunited as in the present instance."

St. Martin's rings, which were fair to the eye, although only brass or copper within, were frequently given as presents to girls by their sweethearts. They are often referred to in old English literature to point a moral; thus in *Plaine Perrell*, the Peace Maker of England (1589), we read "I doubt whether he be gold that glistereth, with St. Martin's rings be with copper within, though they be gilt without, sayes the goldsmith;" and in *Brathwaite's 'Whimzies'* (1611), they are mentioned with counterfeit bracelets as 'commodities of infinite consequence.' They will pass for current at a may-pole, and purchase a favor from their Maid Marian. The name originated from the very extensive franchises and immunities which were enjoyed by the inhabitants of the precincts of the Collegiate Church of St. Martin's-le-Grand. The gilding and silvering of rings made of copper or latten was prohibited by statute 6 Hen. IV. c. 14 under a heavy penalty, and in consequence the 'disloyal artificers,' against whom the enactment was made, appear to have taken refuge in the hallow district. By another statute (3 Edw. IV. c. 4) it was declared unlawful to import rings of gilded copper or latten, but the Act was not to be prejudicial or hurtful to any person living in St. Martin's-le-Grand. In the same reign the like reservation of the rights of the dean of St. Martin's and his colony of outlaws was made. And thus it was that St. Martin's rings obtained their name. The supposed heathen origin of the marriage ring well-nigh causes its abolition during the time of the commonwealth as Butler tells us in 'Hudibras'—

"Others were for abolishing
That sort of matrimony a ring
With which the unassaulted bedchamber
Is married only to a thumb."

Wedding rings, however, have been supposed by some to have been worn by the Jews prior to Christian times, but Selous says that they were only used when the laws were found them prevalent. About the commencement of the sixteenth century Hebrew betrothal rings, called *moahim* (a word which, freely translated, means *joy* (as *you*, or *good luck* to *you*), were common among the German Jews. They were usually surmounted with a small house, temple, or tabernacle, by way of emblem.

Whatever may have been the origin of the wedding ring, the Church took care that it should be interpreted a holy thing. The 'Doctrine of the Mass Book' (1554) contains a form for 'the hallowing of the woman's ring at wedding,' in which are the following prayers—

"Thou maker and conservator of mankind, giver of spiritual grace, and granter of eternal salvation, Lord send thy blessing upon this ring, that they which shall hereafter use it, may receive the virtue of heavenly defence, and that it may profit her to eternal salvation (Theodore Barlet, c. 1540)."
"Hallow this Lent ring with thy power, and continue in thy way and life and grace and wax old in thy love, &c."

Holy water was then to be sprinkled upon the ring.

To be Continued.

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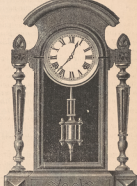
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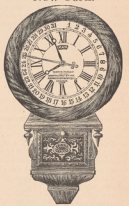
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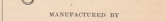
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Practical Hints on Watch Repairing.

By EXCELSIOR—No. 2.

(1.) Every watchmaker thinks he can "put in a hair-spring," and he does it, after a sort. Probably there is no other one thing so generally done, in the whole range of the trade, about which there is such complete ignorance. Not a workman in a hundred can put in a hair-spring in all respects as it should be done; and when done, as it is not in fifty can tell whether it is properly fitted or not. If the general appearance is unobjectionable. Men will claim to be able to "fit a hair-spring the first time trying" who do not really know the object of a terminal curve, and who suppose the supplemental coil of the Breguet spring is designed to make the balances vibrate more freely!

(2.) Now is this ignorance confined to any particular class of workmen. It is found even among professional "springers," when they are induced to break their silent silence and give some reason for their routine manipulations. Theories are often put forth by persons undoubtedly well informed, which are not only absurd, and without foundation in fact, but which it would seem that a single moment's reflection should have convinced their authors were untenable. But others, misled by the omniscience of the authority, take them up, and defend and propagate them, until they almost become accepted as axioms, which no ordinary man dares dispute, and it should be considered an ignominy. I propose to take that risk, and show up the most prominent of these bug-bears, and sweep away some portion of the mist and lumbering that hang around this subject—not by any assumption of superior knowledge, but by applying the plain test of mechanical laws, practical experience and common sense.

(3.) Before proceeding to the more useful operations, it will be useful to consider the mode of making springs. The material employed is of the very best quality of east steel, specially prepared and drawn into wire, and, I believe, altogether imported into this country, wound upon large spools. Steel has the objection of liability to rust, and to be affected by magnetism, but thus far no substitute has been found which should preserve all its valuable qualities and be free from these defects. The only rival worthy of being mentioned is wire made of 18 karat gold alloyed with pure copper, and worked into springs in accordance with the nature of the material. This is free from the two objections named, but long experience has shown that it is not as reliable as steel, besides that it is more difficult to work properly, and its expansibility in heat being greater than that of steel, it requires more adjusting screws in the balance, thus introducing a train of evils which more than offset all its advantages over steel. It is to be hoped, however, that as inventors may yet succeed in discovering a material having all the advantages with none of the disadvantages of steel. Until then, owners must take proper care of their timepieces or suffer the penalty of ruined springs.

(4.) Steel may be made elastic either by hardening and tempering or by compression and springs made in both ways. Springs for Marine chronometers are now almost always hardened and tempered, as are those for the finer classes of pocket watches—while cheap springs are wire drawn and rolled to all degrees of hardness, then wound into shape, and blued by heat, which causes them to "set" in the proper form. The former are more expensive, but are in every way preferable when properly made. Their temper is more uniform, both in the body of the spring and throughout its length; their qualities, whatever they may be, are more permanent, and they are more certainly made of any desired temper. Where the elasticity is given by drawing through wire plates and by rolling, there is the danger of minute cracks being produced in the edges at the final rollings, when the wire is already drawn, which, although imperceptible to the sight, will disturb the action of the spring. But if the spring is to be hardened by fire, it can be annealed and kept

in safe workable condition till the moment of hardening.

(5.) In drawing (or rolling) the wire it is important, 1st: To draw always from the same direction, and, if it is rolled upon a spool after each drawing, it must be unwound and re-rolled before drawing again, as it will commence with the same grain each time; 2d: To draw at a regular rate of speed—not fast at one time, then slow, etc., for such irregularity of speed will produce irregularity of texture in the wire; 3d: To have as few stops as possible, for there will be a difference of texture at that point of the wire that is in and behind the die at the time of the stoppage, no matter how short the stop may be. The best way is to draw the whole length of the wire through at a regular speed without stopping at all; 4th: Wind the wire upon large spools or bobbins, if at all, and do not cramp or bend it any more than is unavoidable, until it is made up into springs; 5th: Instead of oil or beeswax as a lubricant; that will adhere to the wire under any pressure, while oil will not; 6th: Before heating the wire, either to harden or "set" it, clean it thoroughly by rubbing it lengthways with a rag dipped in pure (or 98 per cent.) alcohol, and then with fine emery, until the balance fingers, but with clean tools, or by interposing clean paper or cloth between the skin and the steel.

(6.) There are two principal forms for hair-springs: the flat spiral, either plain or with the Breguet curve, and the cylindrical or helical. The latter is adopted for chronometers, and the former for most pocket watches. There are many other forms not often employed, as the spherical, which is largest in the middle and tapers toward each end, making a globular in form. These are very troublesome to make and set true, and have no practical advantages over the helical form with proper terminal curves. Another method is to make half of the wire in the helical form and the rest is coiled up in the flat form at the end of the helix. The objections to this are that the flat portion of the wire is subjected to violent twistings, being first straightened out from the helix, then wound up again into the spiral form, which would be sufficiently objectionable if the wire was soft, but in this case it is done after the wire is hardened and ready for use. And, even if this objection could be avoided, there is another that the coiling and uncoiling of the helix would inevitably throw the flat portion out of plane at each vibration, and greatly disturb the isochronal properties of the spring, to improve which is the only object of the helico-spiral form. Then there is the reversed helix, being, in effect, a helix broken in two in the middle, and the two ends pinned into a stud in such a way that the upper half of the spring coils up while the lower half is uncoiling, and vice versa. This is difficult and unreliable. The same object is accomplished with flat springs, by using two of them, so attached that one coils up while the other uncoils, as above stated. But no form of spring has yet been tested which produces any better effects than can be obtained from the helix or the spiral, by proper manipulation.

(7.) There are good workmen who claim that a flat spring cannot be made isochronal—which, in view of innumerable instances to the contrary, is as ridiculous as the claim that the spring-detent or chronometer escapement is, *per se*, superior for keeping time to a detached lever escapement equally well made—a point which I shall touch upon hereafter. Theoretically, the helix, with its coils of equal diameter, is superior to the spiral; but practically, the average of the effects of the numerous coils of different diameters is equal to that of a spring with a terminal coil of an intermediate diameter. And a spiral spring with its outer end returned by a properly formed terminal curve is fully equal to a helical spring, for pocket watches; but for chronometers it is perhaps better to make the spring in the helical form, on account of the large size of the wire required for their heavy balances. As both forms are good, I will describe the mode of making each.

(8.) For the helical spring a cylindrical brass block is made, and shallow grooves

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cut in its exterior surface, by a small screw-cutting lathe or otherwise, having the exact shape the spring is desired to take. The wire is then coiled tightly in these grooves, and each end is fastened by screws or pins. But as brass expands more than steel when heat is applied the block will expand more than the wire wound upon it, and injure it more or less by straining it while heated and soft. We avoid this as follows: At each end the spring, if pinned to the block, is drilled in the block, pulled tight and fastened with the pins. This produces a right-angled bend at the edge of the hole. The pins are then loosened, and the wire drawn out of the holes so that, when again pinned fast, these bends or elbows, instead of lying on the surface of the block, are about the breadth of the spring above it. These short upright portions will yield sufficiently to avoid straining the wire when heated, yet are stiff enough to hold it properly to its place. When the ends are fastened by screws instead of pins, the screws should be put on the ends of the block, not on the sides, and each end of the wire being drawn over the sharp edge, produces the elbow as before, which can be loosened up and refastened at the proper height by the screws. The elbows may serve the same purpose of safety when bluing the spring. The object of using brass blocks is two-fold: If of steel, they would be liable to wear more or less by hardening, and communicate an irregular form to the spring, which is, of all things, to be avoided; and a steel block will scale to some extent by the hardening process, and lose the perfect accuracy of its grooves—whereas a good brass block can with care be used many times.

(9.) If the spring is to be simply blued and "set," hold the block with the spring upon it in the flame of the alcohol lamp, turning it constantly, and heating slowly and evenly, till it is heated to the proper color, then let it cool. One bluing is sufficient for a rolled spring, but coloring a hardened and tempered spring is a very different matter.

(10.) If the spring is to be hardened by fire, it is sometimes wrapped in thin sheet copper or platinum foil, fastened with binding wire or folded in the ends, having been previously well daubed over with common soap, softened by warmth, not moisture, which largely protects it from scaling and coloring by the heat, by preventing it from the air. When so wrapped up it must be hardened in water. But most workmen simply slip the block and its spring into a brass, copper, or iron tub, or even a common clay pipe bowl, and fill in around and over the block with fine wood-charcoal dust, well shaken down to fill all the interstices, and entirely exclude the air while the wire is being heated. A small piece of steel wire must be so placed that it can be occasionally taken out to judge of the heat, as charcoal packing is a very poor conductor of heat, and very deceptive to the inexperienced. Very fine silver filings have been proposed, being a good conductor, but I do not know that it has ever been tried. Animal charcoal is also used, but it makes the spring very hard and difficult to form the terminal curves. For a plain spiral spring, requiring no after manipulation, it would be excellent.

(11.) The whole must be carefully heated in a charcoal fire to a cherry red, but no higher, and, as soon as it reaches that, the block with its spring is emptied into oil or water—the preference being for oil, unless the block is wrapped, as is stated above, when it should be quenched in soft water. The proper temperature for the quenching bath is about 60° Fahr., as that is found to give sufficient hardness without danger of causing the steel to crack. But if the wrapping is at all thick a greater degree of oil will be required, and in fact necessary—but that is to be avoided.

(12.) If the spring has been hardened in oil, it is now drawn down to a straw color—if in water, to a purple—then removed from the block and polished inside and out, edges and all, with a stick and fine oil stone dust or "sharp," again fastened to the block as before, and the color brought down to a rich dark blue.

This, however, is a matter which depends somewhat on the quality of the wire used, and can only be fixed by testing your sample. Some steel will be as hard and elastic at a dark blue as another sample will be at a straw color. The aim should be to stop just short of brittleness, so that a piece of the tempered wire may, *edge over*, be bent into a right angle around your screw-driver, but would snap off if it was bent carelessly or over the square edge of your pliers. If the spring is to be used white, it should be brought to the proper temper before polishing. In forming the terminal curves the hardened spring must always be bent by heated tools, a subject I shall treat on hereafter under the head of isochronism.

(13.) In coloring a spring, it is not always necessary even advisable to go by the color of the spring itself, as any piece of steel on the block or plates will do just as well. But there are certain precautions to be observed which are not necessary with larger articles of steel, because here even the slightest variation of the temper affects the action of the spring. Supposing the color should be a little off, if the mass (spring and block, or plates) has been heated rapidly, the coloring must be stopped sooner, or at a lighter shade, say a purple or a reddish-brown; while if it has been heated very slowly, it may be carried to the exact shade desired.

(14.) The screw or piece by whose color we are guided should be hardened, as hard steel colors more rapidly, or with less heat, than a soft piece would do, and consequently there is less danger of redning or scaling too low. Some bluing color or heat their springs once only; others clean the bluing off the color piece and blue again; some even heat their springs five or six times. My own opinion is that if the spring has been properly made, hardened and polished, one bluing is sufficient. But if it has scaled in hardening, or minute imperfections, roughness or cracks are feared, it will be safer to heat twice, but never more than three times. If the spring, after that, breaks under the test named in (12) it may be ordered imperfect, unless it was packed in animal charcoal, when it will break even after the sixth bluing if heat cold. Such a spring, if smooth and perfect, may be blued three times, and will be sufficiently soft. It is understood, of course, that the color piece requires a greater heat to bring it to a blue the second time than that when it was hard, and still greater the third time, so that in reality it will be reduced to a lower temperature or made a little softer at each bluing, although the color is exactly the same each time. This is also the case with the spring, but this need not be whitened after each heating, nor even loosened (if on a block) till done.

(15.) Another point is to avoid what are known as false colors. The color piece, or screw, should be heated to a middle or whole mass, if practicable, is first ground off bright with Turkey or oil stone, or even Scotch gray. This bright spot must then be slightly dimmed again, by rubbing the finger over it once or twice before coloring, for the degree of temper cannot be accurately judged from the color of a very bright piece, as will be found by trial. In coloring flat springs, as hereafter directed, the coloring piece may be screwed in the centre of the plates, holding them together, or in the centre of the spring-cover of the bluing pan, and the heating should be very slowly and evenly done, the center of the hair-spring resting just in the center of the pan, and the cover also being central.

(16.) Before leaving the subject of coloring springs, I may add that it furnishes us a ready means of discovering whether they are equally hardened or not. For instance, if the wrapping (10) touches the spring in some places and does not in others, the former will be harder when quenched. So if the wrapping is lapped on one side or thicker than on the other, the spring will not be so hard in the former places as in the latter. The way to test after cleaning the block, but before loosening the spring, by arranging the block to revolve freely between the centers of the turns, then suspending a trough or half cylinder of sheet copper under it,

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reaching up on each side, protecting its lower half from the blaze, but leaving the upper half exposed to view. Now apply the heat to this copper trough, which it will communicate it to the block, and the latter will be heated more evenly than could be done by applying the blaze directly to it. The block must be constantly turned by a piece of peg wood, and the lathe centers loosened up when it expands. When the spring reaches a purple in its darkest part, take away the lamp and gently, still turning the block till it has cooled somewhat, when an examination will reveal any inequality of temper. Any soft places will be indicated by a lighter color, in spots or streaks, according to its cause. Even the course of a carelessly applied binding wire may be traced. Should any such appearance be found, it must not be passed over as a slight matter, for it is proof positive that the spring is incapable of fine performance, and it must either be re-harpened, or, if it has been scaled in the first hardening, it must be rejected entirely and a new one made.

Jewelers.

The numerous readers of Greville's memoirs will probably remember the references to the great court jeweler, Randall & Bridge. He mentions that the former left a larger amount of personality than had ever hitherto been sworn to at Doctors' Commons—a remarkable circumstance, which probably may be accepted as indicating that he was the wealthiest shopkeeper that England up to that time had ever known. Mr. Randall left the bulk of his property to his great-nephew, one Joseph Neeld, (not Neal, as Mr. Greville has it), and that gentleman's son proceeded, after the English fashion, to found a family by buying a large landed estate, and marrying the sister of the philanthropic Lord Shaftesbury. The marriage was unproductive of neither family nor fortune, and the estates passed at his death to his brother, who was made a baronet in 1859. This gentleman very ungratefully entirely cut the shop off in his pedigree, and preserves as stony a silence about old Uncle Randall, from whom all the good things come, as another family which has succeeded to fame from brass-bottom medals does of its founder. Perhaps if old Randall—notoriously gruff and surly to most of his belongings—could have foreseen how completely he was to have been suppressed, he would have founded the Randall Hospital instead of the Neeld family, after the fashion of George Heriot. "Jingling Goordie" began business in a very small way in Edinburgh about 1580. The little shop he occupied was only pulled down in 1809, when the bellows and forge which he had used were found there. James I. took such a fancy to him that he brought him up to London, and by 1624, when he was 40, the Jingler had acquired the possession of fifty thousand pounds, which represented more than three times that sum to-day.

Jewelers in those days, and for long after, were bankers and money-lenders, so Heriot's money was made in this business. The office of Court Jeweler must, down to a recent date, have been in most countries one requiring a good deal of tact and discretion. Such persons were continually in the thick of all sorts of difficulties and scandals, and we are applied to for help by courtiers and fine people in desperate straits. That famous firm of Boehmer & Boessinge, Crown Jewelers of France, who supplied the diamond necklace, no doubt "knew a thing or two" of the court gossip of those days, quite as curious as the details which Charles Greville so enjoyed punning out of the royal brothers' old *valet de chambre*. Randall was quite up to dealing with his "august" customers. "When a heap of 'em come in to see you," Randall," said the Duke of York, walking round the shop and poking his nose into everything, one day. "Pretty well, your Royal Highness," said he, "with an unmistakable inflection in his voice, 'we sometimes have to wait a long while for our money.'"

A clock was sent.

A jeweler's craft has that about it which

ought to lift it above most trades. There is so large a scope for a man of artistic taste—an element which has for the most part been lamentably lacking with ordinary jewelers. It was the making of Wedgwood that he had the gumption to call in such a genius as Flaxman to design patterns for his porcelain, but how many jewelers employ men of anything like Flaxman's calibre to design rings and bracelets? Who can have looked at the Castellani collection, for instance, without turning with repugnance from the window of an ordinary jeweler, with its warning-pan lockets and horseshoes done in pearl? We hope that, in time, the museum in Fourteenth street will grow rich in these lessons for artificers. In the meantime, it must in justice be said that the great American jewelers and silversmiths have distanced most of their European competitors in special departments. And as a specimen of modern art, the "Bryant vase," designed by Mr. W. H. Whitehouse, of the firm of Tiffany & Co., cannot be surpassed.

The Fitch Diamonds.

Many people have possibly mistaken the purport of the joint resolution passed at the last session of Congress with regard to the diamond necklace presented by the Khedive of Egypt to the wife of Lieutenant Fitch. The resolution merely authorized the acceptance of the present from a foreign potentate. It is by some supposed that the Treasury did allow, or that Congress passed a resolution permitting the diamond necklace to be delivered to Mrs. Fitch free of duty. Such is not the fact. The necklace is still in the keeping of the New York Custom House, and only after the payment of the regular duties can the owners now receive it. It may seem a little odd, but it is nevertheless true, that the necklace has not been appraised by our officials. Nor do the owners evince any great curiosity to ascertain its actual value. This is perhaps attributable to discretion, and calls to mind the famous Portuguese necklace exhibited in the palace at Lisbon. The diamond, though it is large as a hen's egg, and weighs over eight hundred karats, has been the subject of much of cutting and polishing, simply because there is a doubt about it. For there are experts in the trade who pronounce it to be merely a very few pieces of chrysolite. Half the charm of the Khedive's present would vanish if this appreciated necklace were tested by the appraiser's art. This ornament contains, it is said, about seven hundred and seventy brilliants of all sizes, from a seven or eight karat stone to some as small as one-twelfth of a karat. The aggregate weight of the diamonds is at least 300 karats; but the quality is what is known as Cape Eyewater—a quality of diamonds technically described as being of "off-color," and they are well paid for at \$100 a karat, cost of setting and all included. The duty at 25 per cent. on the jewels would at the utmost only be \$10,000. It is a pity that Congress, while graciously allowing Mrs. Fitch to receive the present, did not go further and forego the paltry amount of duty on it.

Mr. J. H. Mathes has recently returned from an extended tour in the manufacture of watches, with an extensive line of watches, embracing a variety of grades, specially designed for this market. Mr. Mathes has effected satisfactory arrangements with several of the most reliable manufacturers for the supply of all the most popular stem winding and setting watches, and to which he invites the attention of buyers.

Removals.

Albion, Lambert & Co., from 14 and 16 Maiden Lane to 13 Maiden Lane.
Howard Clark and Watch Co., from 15 Maiden Lane to 523 Broadway.
Thos. G. Brown, from 193 Broadway to 1 Bond Street.
Snoleson, Reed & Co., from 63 Broadway to 7 Bond Street. Factory, up stairs.
P. Wilton, from 3 Maiden Lane to 14 John Street.
D. E. D. McMurray, from 145 Fulton street to 128 Fulton street.
James Queen, from 83 Nassau street to 78 Nassau street.
Förstermeier, Dreyfus & Koller, from 1 Bond street to 24 John street.

KIMBALL & KITTLE.

MANUFACTURERS OF

Fine Gold Jewelry,

28 BOND STREET,

NEW YORK.

BRAINERD, STEELE & CO.

MANUFACTURERS OF

BRAINERD'S PATENT LOCKETS,

(Patented June 17, 1874).



These Lockets contain the best workmen. They are made of solid gold, and the stones used are the finest diamonds in the market. The cost of them is no more. They are made in the shape of the old style, and the combination of every detail renders them much more desirable. We make three sizes in three different shapes—round, oval, and square, and also a variety of other shapes of the same style, containing a concealed box for miniature—being a novelty new to the world.

And FINE GOLD JEWELRY.

No. 9 Maiden Lane,

NEW YORK.

ALBERT BERGER & CO.

IMPORTERS OF

WATCH GLASSES;

Spectacles, Opera Glasses, Telescopes,

French Clocks, Regulators, Musical Boxes, &c.

47 MAIDEN LANE, NEW YORK.

PARIS, 27 Rue Paradis, Poissonniere. LONDON, 21 Hatton Garden
Factory at Gießenbrück, Moselle, France.

E. T. COOKE, Pres't. R. STRICKLAND, Treas. J. W. COOKE, Sec'y.

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MANUFACTURERS OF

Fine Silver Plated Goods,

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Catalogues and Price Lists furnished on application by mail.

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Attleboro.

JEWELERS AND JEWELRY.

Our first duty must be, in speaking of the pleasant, cheerful, thrifty town of Attleboro, to correct an impression which is all too common with regard to the character of the work made there. "Attleboro jewelry" has become the accepted name for the cheapest class of imitation goods, and it is true that some houses are engaged in this line, in which rings, pins, bracelets and other "bangles" are turned out by the bushel, and sold, by the gross, at figures which make one wonder how calling the material nothing, enough can be realized to pay for the labor necessary. But for every house so engaged, Attleboro has several devoted to higher classes of work; and more than one which deals in gold work alone; and it is but justice to say that Providence, which, by the way, makes more "Attleboro jewelry" than Attleboro itself, can show no nicer work, no more attractive designs, no more enterprising business firms, and no workman more skilled than this quiet little New England town.

In East Attleboro, which is on the main line of the Providence road, the firms engaged in jewelry manufacture amount to about thirty. Some of these make a general line of goods, while some confine themselves to specialties, such as bracelets and sets. Great competition seems to exist in the matter of bracelets, and in Attleboro we saw still further evidence of that falling into requisition of the invention faculty in order to elude cost, to which we referred in our notes from Providence.

The shops of Attleboro deserve something more than a passing notice. As a rule they are large, light, airy, and well arranged, and supplied with every possible convenience for carrying on the work. Situated in a village, with no high buildings in the vicinity, gives them an amount of light in each story impossible to obtain in a crowded city, and a cheerful look which must have a great attraction for the operatives. And of these, too, a word or two must be said.

The operatives comprise both sexes, the greater in the majority, probably, although not greatly. Glancing through the windows of our factories, and pausing to speak with one here and there, the visitor is struck by their intelligence on many subjects not connected with their work, and to notice that in their work, which is mostly of a light and unobtrusive kind, they seem to take real interest and pleasure. Inquiry developed the fact that the women—they are all called "girls" for short—make from \$1.50 to \$2.00 per day, with not a few exceptions, where they work by the piece, in favor of figures considerably higher. The men make from \$2.50 to \$3.50, with the same exceptions in the matter of piece work, and very notable exceptions in the case of engravers, who must be very skillful in the use of tools, and some of whom make very handsome engravings.

In considering these figures it must be remembered that the locality is a New England village, where living is comparatively cheap, and where are lacking those thousand and one opportunities and temptations to spend money which the city offers. On her \$1.50 or \$2.00 a day the Attleboro girl can not only live like and dress neatly, having the comforts of a good home, but lay up something into the bargain, while her sister in the city, receiving the same or more pay even, barely lives along from week to week, in a boarding-house which has not the least symptom of being homelike, works in close, crowded, and uncomfortable quarters, and finds it difficult to lay up anything against a rainy day. Compared with the working women of the great cities, the girls whose nimble fingers fashion the jewelry of Providence and Attleboro are much to be envied, and it is to be hoped that they realize their advantages.

Attleboro jewelry, we mean the cheap article technically so called, sells to an extent and to an amount in value which is astonishing. Passing through one of the groves with its proprietor, and noting a man at work upon a lot of silver rings, we expressed our surprise, not knowing that any demand existed for such goods.

"Any demand?" he answered, with a smile at our ignorance. "Any demand! Of course there is. That is part of an order for two hundred gross that I received from one firm in the West a few days since."

Think of it. Two hundred gross of silver rings. Think of the twenty-nine thousand fingers that they are to adorn! And yet the maker only one order, and didn't seem to strike the manufacturer as being anything unusual or out of due course.

Then there is the article of brass chains, coated with a film of gold so that the color of the brass almost comes through it. The quantities of this which are made surpass all belief.

"I always like to have two or three barrels of that pattern on hand," said one maker, "because then, when orders come crowding in upon me, as they often do, I only have to finish it up and send it off."

Think of watch chains by the barrel. The question is often asked, "How is this cheap stuff sold?" To be sure, it is seldom seen in jewelry stores, and would find little sale there if it were. The great agents in disposing of it are the prize-packer men, the 50 cent and \$1.00 imitations, and the country stores, especially the latter. It has become a regular and staple article in the "notion" line, and especially favorite one with stockpilers, because of its sale at a large margin of profit. For a pair of sleeve-buttons, for instance, which cost the manufacturer perhaps ten cents, which he sold for fifteen, and which have passed through a number of hands, with a profit added by each, have cost the stockholder fifty, he will modestly charge a dollar, and make a clean cash profit of one hundred per cent., and more, in actual amount, than he would realize, all expenses considered, from the sale of a barrel of flour. Although each will sell but little, when we remember how great is the number of country or "general" stores, how universal is the taste for personal adornment, and how cheaply it can be gratified, it is not surprising to find the dealers in Attleboro jewelry doing so prosperous a business.

But we must not forget that the great majority of the houses in this pleasant town devote their energies to the manufacture of work of a much higher class, work which, although it is equal to the best gold work. It is largely what was described in our Providence letter as "stock plate," the meaning of which term was there explained. Upon this material, which looks as well as the best gold, and which, owing to its superior ductility, works much better, an immense amount of taste, ingenuity and labor is expended, both in the general designs and in the decoration, and while some of the styles are a trifle "loud" and startling to suit tastes so inclined, many are as refined and artistic as anything that one would see in our fashionable jewelry establishment, where high rent, plate glass, and "style" generally, bring the price of goods up to a figure all out of proportion to their real value.

A favorite class of work just now is that in which the backs are made of gold. The front, say of a pin or earring is struck up in a die in the usual way, from stock plate whose surface is 18 karat gold. Upon the back of this thin plate of 12 karat gold is soldered, and thus an edge upon which the base metal does not appear at all is secured. When nicely finished, as much of this work is, only an expert can tell it from pure gold, and then not by any appearance of any cheaper materials, but by the fact that the superior ductility of the stock enables the manufacturer to work it by methods which would be impossible in gold.

Attleboro boasts two establishments which devote their attention to the manufacture of coffin trimmings, a business whose proportions far exceed what a person at first thought would suppose. Between them these firms manufacture fully \$150,000 worth of these trimmings annually. They consist mainly of studs of various patterns, struck up from sheet copper in a die, fitted with a nail to fasten them into the wood, and skinned over with the thinnest coating of silver imaginable, a ghost-like film, which well comports

J. A. BROWN & CO.

SOLE MANUFACTURERS OF THE

LADD PATENT

STIFFENED GOLD WATCH CASES

Adapted to the various American made Movements.
Gents', Ladies' and Boys' Sizes. Mansard, Flat, Dome and Bascomb shapes, Hunting and Open Faces, Key and Stem Winders.

Also, Manufacturers of GOLD PLATED LOCKETS in VARIETY.

Office, No. 11 Maiden Lane, New York,

Factory, 58 EDDY STREET, PROVIDENCE, R. I.

Descriptive Catalogue sent on application.

THAYER MANUF'G JEWELRY CO.

SPECIALTY!

Celluloid Jewelry.

The Finest Imitation of Coral in the World!

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[FACTORY, ASTORIA, L. I.]

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LOUIS A. SCHERR,

WHOLESALE DEALER IN

Watches, Jewelry, Silver & Plated Ware,

OPERA GLASSES, SPECTACLES, FANCY GOODS,

Watch Materials, Tools, Glasses, &c.

726 CHESTNUT STREET,

Formerly 403 Chestnut Street,

PHILADELPHIA.

M. A. DU COMMUN,

618 Chestnut Street,

PHILADELPHIA.

Tools and Materials for Watchmakers, Jewelers, Engravers, Gun and

Lock-Smiths, Machinists, Instrument Makers, &c.

Stubb's Tools, Files, &c., Cast Steel, Geneva Glasses, Large Springs for Inventors and Machinists to order.

PRIEST, FULLER & LAWRENCE,

Importers and Dealers in

WATCHES, DIAMONDS,

Jewelry and Gold Chains,

No. 15 MAIDEN LANE, NEW YORK.

Sole Agents for

CHAS. WUILLEUMIER,

Chaux-de-Fonds, Switzerland.

PAUL LAYAL,

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E. A. PRIEST,

F. A. FULLER, Jr.

I. S. LAWRENCE,

with the purposes to which they are put, but which is quite sufficient, as they are seen but for a day, and then enter into the silence and darkness of the tomb.

In conclusion, it may be said that Attleboro, all things considered, is thrifty and prosperous; that her business houses conduct their affairs with shrewdness and skill; that nowhere is the value of labor-saving machinery better appreciated and better understood; that in no factories are more pains taken to turn out the newest and most attractive colors; and that in the close competition which prevails in the business, and which threatens to diminish, rather than diminish, no jewelry-making community that is better prepared for the contest, or more likely to come out with flying colors.

Watches at Waltham.

The industry in which the American Watch Company stands foremost, by virtue of the magnitude of its business and the quality of its production, is perhaps the most complete type of the tendency of modern industrial progress. The watch is the most minute, most complicated, most delicate and most compact of machines; it requires the perfection of proportion and adjustment, and it must be mathematically unvarying, for by it the world of our day regulates its life, and as has been truly said, modern civilization would scarcely be possible without it. Without the watch the railroad could never have been developed. It is the growth of four hundred years, the centuries no one ever supposed that so fine and exquisite an instrument could be made otherwise than by direct human skill; for the watch seems almost mind itself. Yet the problem was years ago solved by inventive America, and the manufacture of watches by machinery has become one of our most notable industries. It has reached almost the limit of the division and of the mechanization of labor, and in so doing has given to the ordinary watch a accuracy which was before impossible in the very best. In introducing the principle of duplication, of the likeness and interchangeability of parts, it has saved vast labor in the repairing as well as the manufacture of watches, and again achieved an accuracy before impossible. It is noticeable that while no product, either of the finest machinery—for it may expand by heat or cold—or of human hands—whose work varies with the conditions both of body and mind—can be infinitely exact, the closest approach to perfection is reached by a combination of the two, in which machinery does all that is possible to it of the processes, leaving to human hands, beside the care and feeding of the machines, only the critical testing and finishing and the adjustment of the products. This combination is more perfectly obtained in the machine-manufacture of watches.

Waltham must once have been a place far from the post. The line was beautiful Chatham River, famous in literature, runs through it, and it is in the heart of one of the most lovely counties of New England. But the "captain of industry" has crowded out the poet and the philosopher, and finds them near enough at Concord and Boston, midway between which Waltham lies ten miles distant from the latter by the Fitchburg road. The large buildings of the American Watch Co. are on the river bank and about ten minutes walk across the bridge from the town. In England and the cotton mill, the oldest in New England, are the chief manufactures of the place, though the business of the American Watch Tool Co. promises to be a growing industry. The road thither is lined by pretty little villages, many of which are occupied by the upper men of the factories; opposite the buildings is Roxbury Park, named in honor of the well-known executive of the Company, and all about are cottages and other tenements for the people of the factory, owned many of them by the Company—of which more anon.

The American Watch Company itself, as an example of industrial growth, is only less interesting than its product. It was founded as the Boston Watch Co. in 1853, at Roxbury, but it was driven thence by the dust of the city streets, which interfered

with the movements. At that time the Waltham Improvement Co., was undertaking the development of this town, and it invited the watch industry to settle here. The present "big clearing" was then thick woods. The manufactory was removed to Waltham in 1854, and the business continued under the firm name of Dennison, Howard & Davis. The price of '57 caused their failure, and they were bought out by Robbins & Appleton. The business grew rapidly under their management and needed more capital while the Improvement Co. had abundance of capital and nothing in particular to do with it. A consolidation, it was said, would be mutually advantageous, and the business of the one and the land and tenements of the other were put together with the capital into a stock company under the present name. The American Watch Co. are the manufacturers, and the present house of Robbins & Appleton, their selling agents, Mr. R. E. Robbins managing in Boston, at the office No. 3 Summer street, corner of Washington, and Mr. D. F. Appleton in New York, at the great building in Bond street. There is also a house in London, at Waltham Buildings, Holborn, in charge of Mr. H. A. Robbins. The firm, however, own a large proportion of the stock of the Company, and Mr. R. E. Robbins is its treasurer and executive manager. In 1892 the American Watch Co. bought out the Nashua Watch Co., in 1893 the latter manufactory was removed to the Waltham works. They were run largely as separate establishments until 1874, when the respective divisions of the two were thoroughly consolidated.

In entering this great factory, one scarcely knows where to begin. The complete watch is like the river as it nears the sea—a hundred tributaries have been simultaneously pouring their little streams to fill it. There are in the factory at Waltham twenty-one rooms, each with its foreman. Some of the rooms duplicate work, for of the finishing rooms there are three, but of distinct departments there are the machine shop, the frame or plate room, the steel room, the punching room, the escape-room, the pinion-forwarding room, and the pinion-finishing room, the jewel-making room and the jeweling room, the balance-making room, the dial room (including the firing room), the gilding room, the engraving room, the nickel-finishing room, and the finishing or setting-up room, and in connection with the making of silver cases, under the same roof, the case room and the case-finishing room. The movement adopted by the American Watch Co., by doing away with the fuzee and chain, reduces the eight hundred pieces of the usual English watch to a hundred and fifty-eight, and thus gains in simplicity and ease of repair; but each of these parts must go through many processes—the balance which is tested, undergoing eighty-four operations,—and probably more than a thousand operations are necessitated to produce a watch. These are carried on simultaneously, and it can hardly be said that at any one does the watch begin. The smaller parts which are produced in duplicate, the wheels, the screws, etc., are sent from their respective rooms to the office, where they are kept in glass bottles until they are called for by the other parts, and the jewels in which there is variation, are sorted by measurement with the needle gauge, which measures to $\frac{1}{100}$ of an inch. When these parts are collected to be put together into a watch, they are then sent kept together in covered trays, holding ten watches each in little "bird's nests," as they are called, the plates of the watch in its part, and the jewels, pinions, etc., in smaller nests, carrying about that for the frame in which they are to be fitted. When these parts are ready, the foreman of writing to follow up all these operations under the one roof, and we shall have to confine ourselves to a few of the most notable.

The company makes not only the parts of its watches, except the brass punchings, which come from Waterbury, but its own regulating and adjusting, and its cheerful, quiet machine shop turns out some of the most remarkable pieces of work produced in this coun-

MORGAN & HEADLY, Manufacturing Jewelers. No. 613 Sansom Street, PHILADELPHIA.

Vest, Opera, and Guard Chains, Stone-Cameo, Coral, Amethyst and Gold Sets, Enamelled and Roman Bands, Roman Lockets, Stone Lockets, Studs and Buttons, Stone and Plain Gold Rings, Gold Spectacles, Eye-Glasses, &c.

JACOT FRÈRES,

Manufacturers and Importers of

WATCHES,

51 Nassau Street,

Manufactory at LOCLE, Switzerland.

NEW YORK.

P. E. ROBINSON,

MANUFACTURER OF FINE

Gold Chains & Seal Rings,

No. 15 Maiden Lane,

NEW YORK.



PATENTED NOV. 13th, 1873

MORRISON'S Gold and Silver SOLUTION;

For Electro-Plating Without a Battery.

The Manufacturer offers the public Gold and Silver Solutions, made from Pure Gold and Silver by means of which plating may be done without use of a battery. They are so simple that all can use them, and at a small expense.

Price List.—Gold Solution, \$3.00; Silver Solution, \$1.50.

The Trade Supplied by ARTHUR B. MORRISON,
Manufacturer and Proprietor, 319 Congress Street, PORTLAND, ME.

FOR SALE BY Palmer, Bechler & Co., 216 Washington street, Boston, Mass.; D. Horwitz & Co., Hatten Garden, London, Eng.; H. Gimel, 31 Maiden Lane, New York; Ephraim Bros. & Co., 9 Main street, New York; Kourany & Stewart, 170 & 172 Street, Chicago, Ill.; A. Klein, 9 King street, Toronto, Ont.; S. Farjeon & Co., 413 Beach street, San Francisco, Cal.; Harwood Bros., 26 Broadway st., Boston, Mass.; Koch & Dreyfus, 218 Charles st., New Orleans, La.

The 18-Day American

Fine Mantel Clocks

MADE BY

Seth Thomas' Sons & Co.

are equal to the

French Clocks, and

can be furnished at

lower prices.

They are warranted

Good Time-Keepers.

New York,

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of the oldest and largest manufacturers in the country.

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TOWER CLOCKS.

Mr. Hotchkiss

has had 18 years' experience

in the business of

making reliable and his

reputation for durable

and reliable work is

second to that of no man

in the country.

Trade Cossip.

Large quantities of Amethysts of fine quality and remarkably free from flaws are being found in Massachusetts.

During the month of April the number of movements manufactured by the Waltham Watch Co. exceeded £20 per day.

J. W. Benson, clock-maker, of Ludlow Hill Lodge, has recently constructed a clock for the St. James' Cathedral, Toronto.

Mr. A. H. Smith, of Messrs. Smith & Hedges, importers of diamonds, sailed for Europe on the 28th, in the steamer *Bethula*.
George Shipman has rendered a decision in the case of Mufford, Hale & Co. vs. Peary, Kersh & Co., establishing the validity of the latter's patent for gold chain links, and granting a decree for compensations.

Mr. Gray, of the well-known firm of Lawson & Gray, importers of coral goods, etc., has recently returned from Europe with a carefully selected stock of coral, black, white, and other desirable goods.

The jewelry store of L. A. Benton, Cleveland, was entered by burglars on the morning of the 9th inst., and a quantity of jewelry stolen from the safe. Mr. Benton was knocked senseless while defending his property.

The jewelry establishment of B. H. Root, 520 Broadway, Albany, was entered by burglars on the afternoon of the 9th inst., during the temporary absence of the proprietor, and a quantity of diamonds, watches and jewelry, valued at \$15,000, were carried off.

Among the two hundred passengers who went down in the ill-fated steamer *Scholar*, we noticed the names of Mr. Carl Schmidt, a partner of the firm of M. Fox & Co., Lapidaries, No. 1 Maiden Lane, and Mr. G. O. Lounsbury of the firm of F. A. Drake & Co., Augusta.

The big clock and bell which will strike the dinner hour from the belfry of Independence Hall on July 4, 1876, cost \$20,000, and are inscribed with the words: "Presented to the City of Philadelphia for the Belfry of Independence by the citizens of Adams and Martha Sarah Seybert, and Caroline, their daughter, by their son and brother, Henry Seybert." They constitute the most costly obituary notice ever published in Pennsylvania, and as fine a case as ever appeared outside the columns of the *Lodge*.

A magnificent centre piece in silver gilt, the work of the celebrated Nuremberg goldsmith, Wenzel Jamnitzer, has recently been acquired by the director of the Germanic Museum, in Nuremberg. This centre piece had long been treasured in the Merkel family, but had long been the subject of the banking firm of Loeckel & Merkel is public. The Merkel collection contains also three valuable collections.

Jet and Vulcanite Jewelry.

The season for travelling is at hand, and dealers in jewelry should remember that Jet and Vulcanite goods are in great demand for such wear. No jewelry is so well suited for tourists, since articles in these materials are both strong and handsome, while at the same time the imitable value is not such as to give anxiety to the wearer. There is always a steady call for mourning goods in these materials, but a special demand exists at the present season for general use for the reasons above stated. We would advise dealers to inspect the stock of the Vulcanite Jewelry Co., at 191 Broadway, whose manufactory is situated at 44 Mercer St., where a large force is employed.

This fine manufactured jewelry in Whitely Jet and Vulcanite, and their stock includes a clock and varied assortment of plain and gold mounted goods of the most finished and artistic workmanship. In Whitely Jet they offer bracelets and with without links, inlaid with gold and set with pearls, pins and earrings set in the same manner; chains and sleeve buttons with and without gold mountings. In Vulcanite they have the same line of goods, and in addition, exhibit scarf rings, belt chains, chateaus, vine-leaf watch cases and lockets, in which last a speciality is made in letters and monograms, carved in gold, and either raised or inlaid with the surface. These last are remarkably handsome, as the gold lettering is shown to great advantage when contrasted with the black ground.

The gold used by this firm is of 18 karat standard, and the goods evidence fine finish and good workmanship. As an important fact we should state in that last good work backed with vulcanite, a combination which gives the strength which has never been needed in this material.

Official List of Patents

Relating to Jewelry, Watch-making, &c., issued by the U. S. Patent Office during the month ending May 4, 1875.

No. 161,067.—Tools for turning metal, C. Cummings, Virginia City, Nevada.

Butter.—The construction of the cutter with a double V-shape, and the means of adjusting the same, whereby, by means of the belt and pulley, the cutter is securely held from turning while at work, and a perfect degree of adjustment is permitted.

No. 161,411.—Clock-cases, Henry J. Davies, Brooklyn, N. Y.

CLAIMS.—1. The escapature, A, arranged in an elevated position, and constructed to receive and support the clock-work, and the glass-plate, arranged over, and enclosing the clock-work mechanism.—2. The elevated escapature constructed to receive and support the clock mechanism, and the glass-plate, arranged over, and enclosing the clock-work, and the escapature, and vibrating within a case below the escapature.

No. 161,259.—Main-springs for Watches, G. H. Miller, Right, Ill.

Butter.—A mainspring having a tongue cut near its outer end to engage in a suitable recess in the barrel, and act as a safety-attachment to the spring and barrel.

No. 161,250.—Stem Setting Watches, J. F. U. Jurgensen, Lauch, Switzerland.

Butter.—In a stem-setting Watch, the combination of a sliding pin, working in the stem, and a ring surrounding said stem, whereby the setting mechanism is thrown into gear by pressure upon said ring, transmitted through said sliding pin.

No. 161,244.—Watch Plates, P. A. Lange, Glashütte, Saxony.

Butter.—A watch plate provided with a slot, through which the barrel-screw may pass, and the barrel thus be removed without raising the plate.

No. 161,263.—Stem-Winding Watches, C. S. Mosely, Right, Ill.

Butter.—Main spring-wheel is changed out, the crown, or inter-wheel, with the winding-stem, being inserted in chamber. An intermediate gear-wheel, connecting the main spring-wheel, and the wheel on the winding-arbor, is carried on a pin, which is made up of two sides at right angles thereto, and parallel with each other, said sections being permanently connected together by a cylinder or collar, as shown, whereby an imperforate joint is formed, and the corners of the arbor to be wound, are prevented from acting upon the meeting points of the sections composing the joint.

No. 161,206.—Watch Keys, Albert Wanner, and Chas. A. Wanner, New York.

Butter.—A watch key, composed of a barrel, composed of two sections, each section having one end in its interior, of a width equal to the width of the arbor to be wound, and two side at right angles thereto, and parallel with each other, said sections being permanently connected together by a cylinder or collar, as shown, whereby an imperforate joint is formed, and the corners of the arbor to be wound, are prevented from acting upon the meeting points of the sections composing the joint.

No. 161,297.—Ornamental Chains, C. Thier, Newark, N. J.

Butter.—An ornamental chain composed of a series of separate rings or links, united by secondary chains, passed through said main rings or links.

No. 161,421.—Watch Keys, Henry Lohmeyer, Strempert, A.

Butter.—The watch-key screws into or upon a hollow push-rod, attached to a steel spring from the catch-spring.

No. 161,513.—Watches, J. B. Hopkins, Washington, D. C.

Butter.—A watch mechanism, in which the vibrating and balance-wheel, and the balance-wheel is pivoted at the center of such motion.

No. 161,674.—Pendulum Clocks, F. Eckel, N. Y.

Butter.—The frame of the pendulum clock, and the movement work upon the same, said frame is formed of a flexible joint, to allow their position as the position of the pendulum frame is altered.

No. 161,712.—Watch Cases, Simon B. Simon, New York.

CLAIM.—A cylindrical watch-case, constructed as described.

No. 161,725.—Stem-Winding Watches, Chas. V. Word, Waltham, Mass.

Butter.—The means for actuating the mechanism, whereby the watch is changed from a stem-winder to a stem-setter, consisting of the combination, with a watch of a case, and a thumb-screw for actuating the cam, and the flattened spring or landing whereby the cam is caused to rest steady after being raised, and again pressed back into its position.

No. 161,726.—Means for Moving Movements of Clocks, Thos. H. Most, New York.

Butter.—A hooked incline, a four-year wheel with teeth of varying length, and a spring-rod with downwardly projecting pin, act in combination, so that the teeth of the wheel will all be notches are left exposed for engagement with the pin, and in the shorter months, one or more of the notches will be engaged by the longer teeth of the wheel, to permit the pin to pass directly to the notch representing the first of the month preparatory to a new revolution.

No. 161,822.—Cannon Fins for Watches, S. Bauer, Passau, Ohio.

Butter.—A Cannon-fine is firmly united to the lower portion of a friction sleeve, and the lower portion of the sleeve is split, part of its lower portion of the sleeve is split, part of its length, to form a spring to clamp the arbor.

No. 161,857.—Watch, S. E. Edwards, Jr., C. H. Henson, Huddersfield, England.

Butter.—A spring-pawl, acting through suitable mechanism upon a lever, presser it upon the barrel with greatest force when the escape is fully wound, the pressure being gradually diminished as the spring is unwound.

No. 161,860.—Means for forming Bands on metallic bars for Clocks, C. Knapp, New York.

Butter.—A blank of the desired outline is stamped from a plate, and at the same time a rim turned up. The edges of the rim so formed, are sent inward by the dies clamped, the upper die having a projecting flange that carries the rim down into a groove in the lower die. A part, of the rim is left raised, and the rim is then pressed down into a groove in the lower die. A part, of the rim is left raised, and the rim is then pressed down into a groove in the lower die.

No. 161,018.—Clock Striking Mechanisms, G. H. Bakessy, Bristol, Conn.

Butter.—In a rack and snail striking mechanism, the combination of the snail, stop-pin, rack, cam-pin, and cam, all operating together.

LeBoutillier & Bride,

IMPORTERS.

10 Maiden Lane, N. Y.

We have just received large invoices of

FRENCH CLOCKS,

BRONZES, and

MUSICAL BOXES,

Especially selected for the Spring Trade.

We would call particular attention to our assortment of LOW PRICED MARBLE CLOCKS and STATUETTES, which our customers can offer to their trade, at prices to suit the requirements of the times.

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Shepard, LeBoutillier & Co.

CRYSTAL CHANDELIERS

GILT, BRONZE & DECORATED GAS FIXTURES,

Fine Marble & Bronze

CLOCKS,

Bronze Figures and Ornaments in Greatest Variety, at Low Prices, Manufactured by

Mitchell, Vance & Co.

No. 597 BROADWAY NEW YORK.

"Medal of Special Award" by American Institution, 1872,

No. 719, GAS FIXTURES.

MITCHELL, VANCE & CO., 597 Broadway, N. Y.

"We find fine Fixtures and Glass Chandeliers, for design, excellence of workmanship and finish in all their parts, to be the best production in the country and we may say, in our judgment, excelled by any other country in the world."

We recommend a MEDAL OR SPECIAL AWARD for CHANDELIERS and GAS FIXTURES.

(Signed) JOHN W. CHAMBERS, Secretary.

"Medal of Special Award" by American Institution, 1872,

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PROCEEDINGS OF
THE HOROLOGICAL CLUB.

**A Distinguished Body of Watch
and Clock Makers.**

Nineteenth Discussion Communicated by the Secretary.

At the day meeting of this distinguished and honorable Club the regular secretary was present in renewed health and vigor. The minutes of the two previous meetings were read and approved with interest, consisting chiefly of desultory conversations, correcting misconceptions and misunderstandings on previous remarks. Mr. Fritz's balance, which, if published, would not tend to general edification, was read. There were several other matters mentioned in Mr. Fritz's last copious paper, which, however, were not discussed, but owing to the number of queries and communications on other subjects which had collected, and which demanded their immediate attention, further discussion on the subject of the paper was postponed till another occasion.

GOING BARREL VERSUS FUZE WATCHES

The following communication is suggestive of the confidence reposed in the power of their honorable body to correct abuses and reform watch and clock work generally.

To the Members of the Horological Club:

Believing that your honorable body has great influence with the trade throughout the States and that you will encourage any movement leading to a real reform, I would respectfully call your attention to a grievance under which we have all suffered, as I think, quite long enough. I refer to the use of the fuzze and chain in medium and low grade watches—which I am sure vexing watchmakers everywhere will unite with me in protesting against as more or less of a nuisance—ask any jeweler who sells such watches ought to be compelled to make his living by repairing them, and save others from the imposition of such work upon them.

There is some excuse for using the fuzes in this way, for the fuzes are the only means for the attainment of the best time-keeping qualities. But one time will work a dozen theories, and it is the only time that will work. The watches in the gun barrel will keep as good time in every respect as the best improved fuzes watches. The only advantage of the watches is that the class of work has found it to be so.

Where, then, is the advantage of the fuzes and the disadvantage of the watches? The answer is to compensate for their extra complication and expense—the extra time, trouble and risk in re-arranging the fuzes. The watches have no advantage, then I submit that, as men of ordinary common sense, we ought, in self-defense, to shut our eyes to the advantages of the watches, and buy or sell them; and when reporting those already in use here, we should either make them the basis of our calculations, or, if we do not enter and to keep them so, or refuse to touch them at all, and let the botchers kill them off as they please. I have no objection to their being why not? I would like to know.

Yours indignantly,
Isquith.

Mr. Mouzeze agreed with their indignation correspondent that the cheap grade of fuzee watches was a source of much annoyance and loss of time and money to watch repairers generally. Yet he considered that the wholesale condemnation of the use of fuzee watches was not necessarily follow. The same arguments and style of reasoning might be applied with equal propriety to show the superiority of the cylinder over the lever or any other good detached escapement. A lever was more complicated than the cylinder escapement, and was imperfectly made, or when out of order, was more liable to the owner of the watch and to watch repairers than the fuzee and chain was.

It was an undeniable fact that watches having cylinder escapements made by skillful workmen run better than any lever escapement with a plain balance that ever was made. Yet, although this was the fact, nobody would ever think of ignoring the lever or any other good detached escapement on these grounds. A lever or some other detached escapement became necessary when watches required to be compensated; and when steadiness of rate was an object, a fuzee was also indispensable. He could not agree with the idea that because some watches having going barrels had run better than others having

a fuzee, that it was owing to the omission of the fuzee that the superior results were produced. They all knew that in instances of that kind the superior running of the watch was an effect produced by entirely different causes, and if a fuzee had been used, better results would have doubtlessly been obtained.

He cordially agreed with the proposal made by their correspondent, that dealers and repairers of watches ought, and might with much profit to themselves, refuse to buy, sell, or repair cheap Fuzee Watches. He was inclined, however, to carry the idea farther and include all notoriously bad made watches of every description, and longed to see the revival of the good old times, which at one period existed in France, when every clock or watch that did not reach a certain standard of excellence was destroyed, and never allowed to be put on the market at all.

Mr. McFuzee then pointed out the complexity of many of the contrivances that became a necessity for the prevention of damage being done to the wheels and pinions of watches having going barrels when the mainspring broke; and for a safe and regular transmission of power with an equal amount of mechanism, claimed that the advantages were altogether in favor of the fuzee and chain.

Mr. Chubbcruser cared nothing about the regular and safe transmission of power so long as the watches ran and did not stop too soon after they were cleaned. If the mainspring broke and damaged other parts of the watch, so much the better. The more things that were broken the better; it was for business. He could clean two Swiss watches in the time he used for one English fuzee watch, and he could get as much money for the one as the other, and on the plea of improving business he claimed that the going barrel was superior to the fuzee and chain.

Mr. Clerkenwell was of the opinion that there was not so much friction on the coils of the mainspring in a fuzee watch as there was in one with a going barrel. In the one case the coils of the mainspring never touched each other at all, or, if they did, it was but slightly, while in the other the coils rubbed hard against each other. He considered this to be a serious defect in the going barrel arrangement and a cause of much irregularity in the effective force of the mainspring.

Mr. Horologer then rose and said that the extra pressure of the coils of the mainspring against each other in the going barbs of the teeth of the ratchet wheel would do the work used and the spring wound up till it choked in the barrel. If stop work was used, and adjusted so that the mainspring was never fully wound up or run down, the teeth of the ratchet wheel would not be in force in action, he could not see how the coils could rub harder against each other in the one case than they did in the other. The mere fact of the main wheel being in the barrel would not make any difference, the force could make no difference in the friction on the coils of the mainspring. He considered that the equalization of the effective force of the mainspring was the great advantage gained by the use of the verge.

The chairman then said that their correspondent "Inquirer" had made some very good remarks against the use of the fuzes in common, and even in fine watches, and as might naturally be expected Mr. McFuzze elaimed the superiority of the fuzes in every instance. Both sides of this question could bear a considerable amount of discussion. He hoped to see the controversy continued, for he had no doubt that it would be the means of dispelling many erroneous though popular ideas, and the best method of applying the main spring to time-measuring instruments.

The Adjuster of the French School claimed the privilege of making a few remarks on this subject. He had often observed that the going barrel had advantages which the fuzee did not possess, and vice versa. In his mind it was as clear as noonday that if both the fuzee and the going barrel was to be used at the same time, and his system of adjusting watches to the ultramundane position adopted, that the name of all perfectists must necessarily follow.

The subject then dropped for the evening.

ing, but "Inquirer" was invited to continue his inquiries should it be agreeable to him to inquire further.

TABLE FOR FILLING MAINSPRING BARRELS

The following table was received in response to a request made at a previous meeting.

To the Members of the Horological Club

I have constructed the following table to show the diameter of the space required inside the spring in various sized barrels and arbors, so that a spring of a given thickness may give to the barrel the desired number of turns.

The column headed B is the diameter of the barrel; A the diameter of the arbor, and S the diameter of the space.

A. D. L.

Warren, Ill.

[illegible]

A vote of thanks was passed by the Honorable Body in acknowledgement of the time and labor that must have been spent by the author in the construction of the above table.

REMOVING MAGNETISM FROM WATCHES

THE MEMBERS OF THE HONORABLE CHAMBER.

[illegible][illegible]

Mr. Secords Hand had had about fifty magnetized watches pass through his hands, but he had never been charged with magnetism by a person proving that he could stop a watch without opening the case which was a very good thing for him, for he had had about 1000 such watches. In every instance he had succeeded in removing the magnetism so that the watches never gave any trouble after he had removed the magnetism. The following: He first took the watch apart and charged the steel pieces separately, as to make sure of their polarity. He then took the watch apart again and removed the magnetism from the different parts of the watch in exactly the opposite way which he had put it in, and in just the same way he removed the magnetism from his knife. He then charged one piece and took it out before it had any magnetism. He then charged another. One can easily tell whether it has any magnetism or not. He took the steel, but first be sure that these pieces have no magnetism in them.

Mr. Horoluger had no faith in removing magnetism from steel by any of the methods. The polarity might be changed and the effects of the magnetism partly neutralized, but it still remained in the steel. He would, however, reserve further remarks on the subject till another occasion.

AN IMPROVED TOOL.

Mr. Second's Hand had some time ago noticed in one of the published reports of their proceedings that a few remarks had been made on the best method of holding a watch case while fitting a case spring. The annexed diagram showed his method.

Diagram A illustrates a pair of pliers with a curved, flexible spring mechanism. The spring is shown in a curved position, labeled 'A'.

THE BROADWAY WATCH.

A communication was then read from a correspondent in Illinois enquiring in the merits of the "Broadway watch."

The chairman then rose and said that as a rule their honorable body considered themselves altogether above taking note of any enquiries of a purely mercantile character. As regards the "Broadway watch," however, he could state that it was perfectly reliable, and was equal in every respect to all that was claimed for it in the circulars.

At this stage the honorable body adjourned, several interesting queries and communications laying over till the next meeting.

THE AMERICAN WATCH COMPANY OF WALTHAM.

Stem Winding Movements.

The universal success of the several grades of Stem Winding Movements produced at this establishment has authorized the Company to extend their facilities and increase the production of this class of goods. They have thus been enabled to keep up their force of workmen, while other factories have been obliged to discharge a large proportion of their employees. The growing demand for Stem Winders is such that it is believed that a watch with a separate key will ere long be shown only as a curious relic of the past.

THE INCREASED PRODUCTION ENABLES THE AMERICAN WATCH COMPANY to reduce the price of their movements considerably and thus to bring them within the means of all.

Silver Cases.

TRADE  MARK.

The American Watch Company continues to hold the lead in the manufacture of Silver Cases, notwithstanding the great competition. These are made in the same factory with the movements. Their success is due to the simple facts that they fit the movements accurately, and that their quality is absolutely maintained up to the standard of American coin.

This can always be relied upon, and purchasers desiring this security should require the stamp of the American Watch Company. It is notorious that the majority of other Silver Cases are alloyed from 5 to 10 per cent. The Company have lately made arrangements to increase their supply of Silver Cases to meet the growing demand for reliable goods that will stand the tests for quality and will not stop the movements.

Gold Cases.

The success of the new Gold Cases of the Company is even more encouraging, and notwithstanding the dull times the production of their shop is greater than ever before. This, they believe, is because they are known to make every case PLUMP as stamped, a special certificate of quality accompanying each case on the legal guarantee of the Company. They maintain also the standard of workmanship, and do not follow the frequent plan of requiring their Cases to be made as cheap as possible, without regard to the character of work. The same is true of the decoration of these cases. They direct their workmen and engravers to make and finish these Cases AS WELL AS IT CAN BE DONE, and the result is a GOOD CASE and a HANDSOME CASE. These Cases consequently wear well, and please the purchaser, who exhibits his watch with pride, while they cost but little more than the poorly made and ugly cases, of doubtful quality of gold, with which the market is flooded.

Curiosities of Clocks and Watches.

By EDWARD J. WOOD.

The identical watch that Quare made for James II., and that was preferred by the possessor of John Stuenkel, of Newell, near Newcastle-upon-Tyne, when in a letter to the "Morning Chronicle," dated December 11th, 1823, he gave the following description of it: "The case is of gold, which is of very pure gold, is embossed with the king's head in a medallion, under which on the right is Fame in the clouds, with a trumpet at her mouth, which is held in her left hand; in her right is a wreath, which she is raising as if to crown him. On the left are two winged boys supporting the royal crown; under them a tower and fortifications, on which is a flag flying; under all is the sea running close to a fort, and on the sea is a ship under sail. This case is also beautifully engraved and pierced with scroll-work, ornamented with cannon, mortars, shot, shells, kettledrums, colors, and other trophies of war, and with crowns, sceptres, and other emblems of royalty. The face is of gold with black Roman numerals for the hours, and figures for the minutes. In the centre is a piece of pierced work in gold upon which, representing the letters J. R. R. J., combined so as to appear like an ornamental scroll, above which is the royal crown. The box is exquisitely pierced with scroll-work, interspersed with flowers; about the hinge is engraved a landscape, with a shepherd sitting under a tree, playing upon a pipe, with a dog at his feet, and houses, trees, etc., in the distance. On the back of the box two circular lines are drawn, between which is the following inscription:—"James II. gloria Deo in exilium sine pretio rediit mini mali lege ablatum bene. Regi restitutor." Within the circle described within the inner line is engraved a figure of Justice in the clouds, reclining upon her left arm the hand holding the scales; in her right hand is a sceptre, with which she points to three bishops beneath her, with an altar before them. On one side of the watch the Tower of London, with a group of 28 men carrying bags (I presume intended to represent money). On the other side is a view of the City of London in perspective, and a group of 28 men carrying similar bags, of which there are several more lying in the foreground; under all a lion and a lamb are lying together. The watch is considerably thicker than, but otherwise not much above, the common size; and every part of the engraving beautiful and distinct. It goes accurately, and is in a perfect state of preservation."

A patent was granted to Daniel Quare on August 2d, 1695, for the invention of a portable weather-glass or barometer. He was much respected by the trade to which he belonged. At his funeral, on March 20th, 1724, most of the watchmakers of London were present. He was interred in Quakers' burial-ground at Bunhill Fields. Several artists followed in the same line as himself, particularly Tompion, Julian Le Roy, Collier, Larcay, and Thout. Quare's rival, Edvard Barlow, whose real name was Booth, was born near Warrington, and ordained in the English College at Lisbon. He took the name of Barlow from his godfather, Ambrose Barlow, a Benedictine, who suffered at Lancaster for his religion. Dodd in his "Church History," says of Barlow:—"He has often told me that at his first perusing of Euclid he was as easy to him as a newspaper. His name and fame are perpetuated for being the inventor of the pendulum watches; but according to the assertion of many projectors, while others were great gainers by his ingenuity, Mr. Barlow had never been considered on that occasion, had not Mr. Thompson (accidentally becoming acquainted with the inventor's name) made him a present of 200*l*. He published a treatise on the origin of springs, wind, and the flux and reflux of the sea, &c., &c., &c., and died about two years afterwards, nearly eighty-one years of age."

The Rev. G. S. Wasey has a magnificent gold repeater by Tompion, approximately as good as ever it was, and weighing over six ounces. Madame Bauszale, of Paris, had a large gold repeating-watch, set with

diamonds, and that chimed the hours. It formerly belonged to the King of Spain. In the South Kensington Museum is a gilt-metal repeating-watch, chased and pierced, the sides being ornamented with hunting subjects; and the back with scroll-work; the dial is engraved and gilt. The maker's name is "Thomas Taylor, in Holburn;" the diameter is two inches and a quarter; and the article was purchased at the Bernal sale for 3*l*. 10*s*.

In the "Philosophical Transactions" appears an account by Godfrey William de Leibnitz of his portable watches, in 1675. This eminent mathematician and philosopher was born at Leipzig in 1646, and died in 1716.

In 1686 Clement, a London clockmaker, invented the cylinder escapement, with the horizontal wheel; but this plan was not brought into use until the following century.

The engraved portrait of Edward Baskwell, Alderman of London, who died in 1676, was published; it represents him in a flowered gown, with a watch. In a gallery at Hampton Court Palace is the portrait of a man with a watch in his hand, the artist being Peter Van Anst, who flourished in the seventeenth century. There is extant a round silver watch, with double case, of the time of William III., which measures upwards of two inches in diameter, and one inch and a quarter in thickness. In the centre of the dial-plate is chased a shield, with an escarpment and a cat's head; and on it is engraved the maker's name, "Wise, Reading." The hours are in Roman numerals, the minutes marked with strokes, with the five minutes distinguished in Arabic numerals, in the outside the circle of the strokes. The figures are engraved on silver filled in with black enamel. The hands are of blue steel. On the back-plate is inscribed "Lobs Wise, Reading;" and the cock is very richly wrought.

A touch-watch is one by which the time of day may be felt. Brevet inventors of the watch, in which the hours were indicated by eleven projecting studs around the rim of the case, while the pendant marked twelve o'clock. When the hand of the watch was placed in the index or hand, which when moved forward would stop at the portion of the hour indicated by the watch, so that by means of the studs and pendant the time could be easily felt and counted. For instance, at half-past two the index would stop in the middle of the space between the second and third studs from the pendant. To the blind, as well as to persons travelling by night, these touch-watches must have been invaluable. The subjoined advertisements for the recovery of touch-watches which have been stolen, occur in newspapers of the years 1678 and 1692 respectively:—"Lost out of a person's pocket, upon Wednesday night, being the 27th of November, betwixt Prince's street and St. John's street (Clerkenwell), an old flat silver watch, with a studded case, and little knobs against each hour, to feel what's o'clock. It was made by Mr. John Bayes. Whoever brings it to Mr. Adams, a barber in Stanhope street, near Clare Market, shall have twenty shillings reward." In the "London Gazette," No. 244, February, 1692, we read:—"Lost, between Pickadilly and St. James street, on Monday last, in the evening, a gold watch, made fast in a gold studded case, with high pins on each hour; made by Mr. Taylor, at the end of Fetter Lane, Holborn. Whoever brings it to Mr. Harrison, goldsmith, at the 3 Flower de Luce, in the Strand, shall have a guinea reward." The late Duke of Wellington possessed a fine watch of this description, which was presented to him by the King of Spain. A touch-watch for the use of the blind was exhibited by Mr. Dent in 1851; it was of his own manufacture.

A satirical poem, published in 1690, entitled "Mundus Mulieris," describing a fashionable lady's toilette, says:—

"Gold is her toothpick, gold her watch is,
And gold is everything she touches."

In the same poem references is made to the lady's diamond croch, which was the hook to which were chained the wearer's watch, seals, intaglios, and the like.

To be continued.

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Also, a full line of Reliable CHRONOGRAPHS,

AND AGENT FOR THE SALE OF

INTERNATIONAL WATCH COMPANY'S WATCHES.

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Sole Agent for Mathez Prores Celebrated Watches.

NICOU & HOWARD,
Importers and Manufacturers of WATCHES.SOLE AGENTS FOR THE
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Nicoud & Howard

N. P. H.

14 John Street, New York.

P. O. Box 2269.

ARNOLD NICOU.

H. HOWARD.

Beaumarchais.

This extraordinary man, whose real name was Pierre Augustin Caron, was born in 1732. His father was a watchmaker of the Quartier Latin, and he was the only boy of six children. He was brought up to the paternal calling, for which, in his early years, he seems to have had little taste, and to have been much repelled for music, of which he was passionately fond. Of the education he received we have little means of judging; it could not have been very liberal; but he spared no labor in after years to make good his deficiencies. At this period, however, when the almost Oriental lines of caste which had obtained under the Grand Monarque were being broken down by the freer manners of the court of his successor, and class was gradually blending with class, not only by association, but by marriage, the Parisian bourgeoisie was making rapid strides both in education and refinement, and in these respects was equal, if superior, to his descendants of a century later. Thus we find the elder Caron to have been a man of some cultivation. Two of the sisters were remarkable for taste, wit, and educated intelligence. One was a very fine musician; the other, Julie, who retired later in life into a convent, is not unknown in literature. Thus we find that the early youth of the future author of "Figaro" was passed in an atmosphere of high social and intellectual culture, more than his birth might lead us to suppose.

Young Pierre was decidedly precocious and a sad scapegrace, and probably set to himself the proverbial example of *Gil Blas*. At thirteen he was in love with a girl several years older than himself, and when she laughed at him, expelled upon the desirability of suicide. Two or three years later his father expiated him from some account of irregularities of conduct, taking care, however, that he should find a safe shelter beneath the roof of a near relative, where the prodigal wrote very penitent letters, to which the father replied by an offer of his reconciliation upon certain conditions, which reveal the nature of the offences. Among others, that the orders were to be taken, executed in the business without his knowledge and authority—a condition which points to speculation; that he was not to sit at six and wait for the day of his against which we may write, predisposition to idleness; that he was not to go out pleasure seeking on Sundays, and then among his immediate relatives, and then by friends, and that he was always to be home by nine at the latest—upon which we comment, love of late hours and indolent company; and that the only time he should give up to music was between supper and bedtime. Rather rigorous conditions these, would think apostrophes of the present day. Nevertheless, the culprit assented to all, and benefiting by the lesson he had received, applied himself diligently to his trade. At the age of twenty he invented a new system of escapement, which proved to be a very real improvement in watchmaking, and the discovery published in a number of the *Mercur*, 1753, was impudently appropriated by Lepaute, watchmaker to the Luxembourg, who treated for impunity to the obscurity of the inventor. But little did he know Pierre Caron, who at once commenced a lawsuit against him, and continued for his life was one long series of litigations, one of which extended fifty years beyond it. The Academy of Sciences, which the question was brought, decided in his favor. This affair made some noise in Paris, and even attracted the attention of the court. The King ordered one of the new watches to be made by Caron presented to Mme. De Pompadour a tiny watch of exquisite make set in a ring; after this he was employed by the courtiers, and took the name of the "King's Watchmaker."

As soon as Beaumarchais appeared at Paris, with a consumptive mother, the women were struck with his lofty stature, his slender, elegant figure, the regularity of his features, his bright, animated complexion, his confident bearing, that air of command which seemed to raise him above all who surrounded him, and finally with that involuntary ardor which he exhibited on their appearance.

One day a very handsome lady, about thirty, brought a watch to the shop to be repaired. A glance at the face was requested and obtained permission to be himself the bearer when it was finished. The lady was the wife of M. Franquet, a clerk of the royal kitchen, who was old and infirm. She conceived a violent passion for the young watchmaker, and the husband even had made no objection to the close intimacy that ensued; indeed, so complaisant was he that a few months afterward he made over to him his entire business, in consideration of the complete obligation, died soon afterward.

Within eleven months of the demise of M. Franquet young Caron, equipped the widow and assumed the title of De Beaumarchais, from a fief supposed to belong to her—a fief which, it is probable, existed only in his imagination. She survived her second nuptials scarcely a twelvemonth, and having neglected to register the marriage contract, he lost her property.

Those musical studies which his father had so rigorously restrained now stood him in good stead, and were the means of his first real advancement. Besides being a very fine performer upon the harp, an instrument then scarcely known in France, he had made some improvements in its construction, and his skill in his playing being reported to the King, he was sent for to perform in the presence of majesty. His success was so great that our old auditors started to have "a taste of his quality," and in a short time he became their musical instructor; not for his hire, he soared too high for that. Such was the favor and familiarity he now enjoyed at court that on one occasion, every chair being occupied when he entered the music room, the concert was the King to hear him that he pushed his own seat toward him and insisted upon his taking it. He even won the good opinion of the not too sociable Dauphin, who paid him the high compliment of saying, "He is the only man who speaks the truth to me."

That such favors should slightly intoxicate young Caron, and lead him on with exaggerated notions of his merit, is not at all surprising. Nature had created him something of a coxcomb, and such was the force of his own vanity, that he was not without a certain degree of that tendency. These failings and largely of his sudden rise, made him many enemies, and he was not without frequent opportunities of mortifying and insulting him. One day a young noble requested him to examine his watch, which he answered as out of order. "Since I have left off the business, I have become very unskillful in it," replied Beaumarchais coolly. "You will not refuse me this favor," persisted his tormentor. Beaumarchais took it, held it up as high as he could on pretense of examining it, and then let it fall. "I warned you, sir, of my unskillfulness," he said, with a low bow, and passed on.

His influence with "Mesdames" enabled him to confer upon a person whose gratitude laid the foundation of his future colossal fortune. Louis Du Verney, the celebrated financier, had just created the office of Minister of the Treasury, and his purposes having been designed by Pompadour, who since the beginning of the Seven Years' War had fallen into disfavor, was looked coldly upon by the royal family, and during nine years he had vainly entreated a royal inspection of his work, and even implored for the grant of his patronage; he was now a very old man, and this visit had become the most desired object of his life. It is a striking proof of the influence which the King's ministers held at that time when we find so rich and noted a man as Du Verney applying to him to bring about the accomplishment of his wishes. And he had not mistaken; his man; in a short time the clever young courtier prevailed upon the King's sisters to visit the eccentric financier, and afterward the King himself followed their example. As a reward for this service Du Verney gave him a share in a speculation to the amount of 60,000 francs and then cementing a connection which brought much wealth to Beaumarchais, and which was dissolved only by the death of his patron.—*Temple Bar.*

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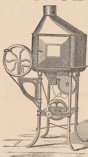
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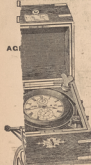
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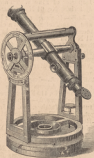
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Assaying Gold and Silver.

Continued from March Number.

Put about sixty grains of lead in a cupel, and cupel the silver as usual. Then weigh both button. If they both weigh exactly alike, the alloy is standard. If it is 1 dw. less, it is called 1 dw. less than standard; if more, it is called 1 dw. more than standard.

In large works it sometimes occurs that copper bars or ingots may contain silver; with so large a quantity of copper it is inconvenient to cupel.

The mode of assay is best performed as follows:— Weigh off three pieces of about fifty grains each, and place them in three scorifiers, with the usual precautions; scoriafy to the extreme limit, and place them altogether in another resulting button. Of course borax must be added as usual, as well as six hundred grains or so of pure lead. All native silver, that which remains on the sieve during the sieving of rich ore, rough silver, etc., may be all most conveniently assayed by the above simplification method.

Alloys of platinum, silver, and copper are not likely to fall under the everyday assayer's notice, and are therefore unnoticed.

Assays of alloys of silver and gold will be noticed under "Gold Assaying."

Lead Tests for Silver Cupellation.

1000 parts fine silver require 3 times of lead.	
950 " " " "	6 " "
900 " " " "	7 " "
850 " " " "	9 " "
800 " " " "	10 " "
750 " " " "	12 " "
600 " " " "	14 " "
500 or less " "	17 " "

In gold assays, avoid double the above quantities of lead are required.

General Observation on the Assay of Silver Ore.

All silver, and especially gold ore, which contain a large proportion of sulphur or arsenic or antimony, should be cupelled. In the case of sulphur there is danger of oxyphosphates forming and conveying portions of the noble metal into the slag along with them. No particular care is required in roasting ore. The best way to effect it is to half-fill two crucibles with the ore, and place them on top of the coke in the reducing furnace, and in a common fire, and keep continually stirring the ore with an iron rod. Roast slowly at first, and, after no more dense fumes are given off, heat the contents to a dull red heat, till they are quite "sweet," if much arsenic or antimony is present, a little finely powdered charcoal is added to reduce the arseniates or antimonites.

In the case of galena, which, of course, is very fusible, some fine sand had better be mixed with the ore previous to roasting.

In scorification it is best to give not too strong a heat at the commencement. At first the ore will be seen floating about on the top like a small island; when this disappears and is melted, the slag rises to the top and encircles the bath of molten metal like a ring. During this period the heat ought to be raised, and may be still further increased to the end of the operation. About sufficient borax to wet powder over the mixture must be added at first, and, if the fusion seems to stick, a little more must be added in a piece of paper. It is as well to add a small piece of glass of borax at the end of the operation to thoroughly fuse the slags.

In cupellation a button of lead about 300 grains in weight is the best size for operating upon. In case the button of silver is very large, great care must be taken in cooling till it will "spall."

The proper heat for cupelling is when the assay just passes well and no more towards the end of the operation the heat may be increased. It is generally recommended to prefer a high heat and quick cupelling to a low heat and a lengthened time. This is a great mistake, as silver in conjunction with lead is sensibly volatile at a high temperature. The poorer the button is in silver, the higher the temper-

ature may be kept, as there is obviously less silver to volatilize.

Occasionally the button stops, or, as it is called, suddenly "freezes;" this is nearly always due to too little heat being employed in the furnace, but of course never happens with ordinary care. If it does happen, unless great haste is needed, always cupel afresh. Some assayers close the door of the muffle when cupelling, but it is always better to have the door partly open during the operation.

On detaching the button, if it comes off extremely easily, and is bright before, it is sure to contain lead, and should be rejected. If, however, it is flat and not rounded nicely, it has not had sufficient lead.

In running down ores in the crucible method, care should be taken not to employ too much charcoal, otherwise the slag comes out black, and retains portions of the silver. One part of charcoal to twenty-five of litharge is the best proportion in ordinary cases. It is always best to powder over the top of the contents of the crucible with litharge, in order that the rain of metal dust may pass through the contents and take up every particle of silver contained in the ore. Directly the contents of the pot cease bubbling, and flow smoothly, they ought to be poured into the mould. If the borax boils up, the crucible must be lifted gently out, tapped once or twice on the side of the furnace, and cautiously replaced. It will soon subside.

Remarks on the Operation of Cupellation

The furnace must not be too hot nor too cool. If the heat is high, silver is volatilized, and the pores of the cupel open and absorb minute portions of the metal. If the heat is too low, the button will be sure to retain minute quantities of alloy. It is difficult to give exact prescriptions for the regulation of the heat; but the fumes of lead rise straight up to the top of the muffle, the heat is too high, and the cupel must be moved nearer to the door. If however the smoke falls to the bottom of the muffle, the heat is too low, and the cupel must be moved farther in.

As the muffle gets so close, the heat must be exactly of the necessary heat by observing the color in that part of the cupel which has just been left by the bath of lead. If this appears a white, the heat is too low, the assay is at the right temperature. If the cupel is of a white-red, the heat is too high, and if it is almost black, the temperature is too low. When the assay is fully finished, it is better to pull it slightly towards the door of the muffle, and, when nearly finished, to place it at the back, and close the door of the muffle. The button appears dull for some time after it has ceased giving out the rainbow colors, and all of a sudden "brightens." In order that the assay may be correct, the time between this dullness and the brightening should neither be too long nor too short. This time varies with the heat of the furnace and the texture of the cupels.

Assays of alloys of $\frac{1}{10}$ generally require about thirty seconds to produce this brightening, while those of $\frac{1}{100}$ only require about ten seconds. In very compact cupels the brightening shows itself with great facility, and very quickly; but in this case it is requisite to finish them with a high temperature.

When a larger portion of lead is used than is required, the assay experiences a considerable loss from being so long in the muffle. If, however, the lead is in too small a quantity, the contrary takes place; the buttons of copper and the result will be inexact. Buttons that have been cupelled with a great excess of lead nearly always degenerate; they not only shine brilliantly and are nearly round instead of presenting a hemispherical shape; they, moreover, adhere very slightly to the cupel. The assays, on the contrary, that have been cupelled with too little lead do not brighten, and produce buttons with black patches of oxide of copper on their surface; the buttons also adhere very strongly to the cupel. As has been already stated, the time of the brightening must not be too long nor too soon after the disappearance of the rainbow colors. When the brightening appears too soon, a round button is rarely obtained; on its surface

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are seen lustrous and also some dull white spots; the button adheres but slightly to the cupel, and sometimes has small needles like holes below, which is a sign that it has not had enough heat at the finish. When, however, the brightening is too long in appearing, the button which is obtained is of an uniform dull white, with black patches of oxide of copper on its surface, and some small depressions; it adheres very strongly to the cupel, is black below, and frequently vegetates.

The signs of a good button are the fact of its being round, lustrous, and crystallized below, easily detached from the cupel, and white on the bottom.

Galenia may be assayed by submitting it to a direct cupellation, even when the substance contains 2 or 3 per cent. of pyrites or blend. We may effect this without adding lead at all; but there is danger of the sulphate of lead which is formed covering the bath, impeding the oxydation, and adhering to the button of silver. It is, therefore, better to add lead in the proportion of 3 to 4 per cent. *Galenia* has a remarkable tendency to throw out sparks when submitted to heat, and we must, therefore, grind it to a very fine powder in an agate mortar. A few grains are taken enveloped in a sheet of lead, and introduced into a cupel in a good hot muffle, and the door closed: the instant the mineral fuses, the sub-sulphate which is formed swims on the surface of the metal. As soon as the contents have acquired the same temperature as the cupel, the muffle is opened, and air admitted, but cautiously, or else particles of mineral are sure to be projected from the bath of lead. Much smoke now arises from the cupel, and the surface of the bath appears covered for some time with a solid convex film or crust, which, as the dross settles down and gets thinner and thinner. When the smoke diminishes, the temperature may be increased to a considerably higher point than in any ordinary cupellation, in order that the litharge which is formed may melt and pass into the cupel the greater part of the sulphate of lead which was formed at the beginning of the operation. The lead now uncovers more and more, and at length appears brilliant. The cupellations may not be finished as usual. This method of assaying is tolerably pure *galena* is quick and accurate. In a series of assays instituted by Malaguti, the ley of silver was sensibly greater by this method than by the crucible operation.

Doncey recommends the cupellation of the chlorides of silver thus:—Take six grammes of the chloride, and mix it with five grammes of granulated lead; envelope it in eight grammes of sheet lead, and melt it in a small crucible. By this means not more than 0.04 of silver is lost. He adds, however, that it is better to employ litharge and charcoal, to avoid volatilization of the chloride. But, as we have seen, carbonate of soda must be invariably added to these assays, or else a very considerable portion of the silver is lost.

ASSAY OF SILVER BY THE WET METHOD.
This very ingenious method was invented by the Frenchman Gay-Lussac. It is remarkably simple, clean, accurate, and quick in operation.

Cupellation, after all, only gives an approximate result, whereas by this method mathematically exact results are obtained. All complicated processes will be omitted in the following description, as the assay can be quite accurately made with the simplest means.

APPARATUS &c., REQUIRED.

Pure rock salt, and pure nitric acid.
Pure distilled water, and pure nitric acid.

Three or four pipettes accurately marked to 1,000 grains.
Six or eight decimal pipettes, marked in equal divisions = 100 grains in all.
Half-dozen glass stoppered bottles, having the numbers marked both on stopper and shoulder.
Perfectly clean hands, free from perspiration.

METHOD OF ASSAY.

Take 162.5 grains of the pure salt, or a little more. Dry it carefully and thor-

oughly, and weigh the 162.5 grains accurately before you grind it. Clean out an ammoniac bottle, and pour the salt in, and add 30,000 grains of the pure distilled water. This constitutes the *normal* solution. Take 1,000 grains of the above solution, and run them in the shorter sampler bottle with a wide mouth, and dilute to 10,000 grains by adding 9,000 grains of distilled water. This is conveniently done by weighing a little 10,000 grains capacity. This forms the *decimal* solution of salt. Take 10 grains of pure silver, most accurately weighed, and dissolve it in a little *pure* dilute nitric acid, and dilute it to 10,000 grains by adding pure distilled water as above described. This forms the *decimal* solution of silver.

First of all, standardize your solution. To do this, take 10 grains of pure silver; dissolve it in pure dilute nitric acid (half water & half acid), and pour the solution in a best glass tube, and there are no more of them left: this is effected in one of the stoppered bottles. Now dilute to the mark in a pint, and warm the solution till nearly the boiling point. This can be most conveniently done by placing a large saucepan on the fire or brazier, and making the water boil; then immerse the bottle in the water. While the bottle is still in the saucepan, take a pipette full of 1,000 grains of the normal solution, and, placing the nose of the pipette in the bottle, let the measure run in. Now replace the stopper, and, taking hold of the bottle with a damp cloth, place your two thumbs on the stopper, and shake violently for at least five minutes. Then give a circular twist and allow to settle.

To be continued.

Finger Rings.

In the Hereford, York, and the Salisbury missals directions are given at the marriage for the ring to be put first on the thumb, after on the second finger, then on the third, and lastly on the fourth finger. The rubric still contains the fourth finger, because it is the ring finger; and the left hand is chosen, it is said, because the wife is in subjection to her husband, but this is doubtful. It is true that official rings are worn on the right hand, but the left hand has more usually been the favorite one for rings, probably because it is less used than the right.

In many parts of the Continent wedding rings are worn by husbands as well as by wives. The wedding ring worn by Luther, to which we have previously referred, was a gimmel, and consisted of two perfect rings. On one hoop was set a diamond, as the emblem of power, duration and fidelity; and on the other, a ruby for exalted love. On the mounting of the diamond were engraved Luther's initials, and on that of the ruby his wife's, so that when the two parts were joined the letters came close together. The motto within was *Was Gott zusammen fuget soll kein mensch scheiden* ("What God doth join, no man shall part").

Formerly widows wore their ring on the thumb, in emblem or widowhood, and we find the following trick mentioned in the *Spectator*—

"It is common enough for a stale virgin to set up a shop in a place where she is not known, where the large thumb ring supposed to be given her by her husband quickly recommends her to some wealthy neighbor, who takes a liking to the lady whose thumb would have overlooked the veritable spinster."

The old wedding ring usually had its motto, which was often pretty and appropriate. We will set down a few of these posies that were once common—

- 'Let liking laste.'
- 'I should never so agree'd.'
- 'Kiss in love on Christ alone.'
- 'Is Christ and then we may comfort be.'
- 'First I love Christ and then for thee.'
- 'Next to Him love none but me.'
- 'Let us share in joy and care.'
- 'United hearts shall only parts.'
- 'A faithful wife preserveth life.'
- 'This is the giving of my heart forever.'
- 'This hath I ally, my love is pure.'
- 'The diamond is my love.'
- 'I like my choice.'
- 'Love and live happily.'

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The wedding ring of St. Louis, of France, was set with a sapphire intaglio of the Crucifixion, and bore on the hoop the motto, 'Dehors est en, pourrons avoir amour.' Anne of Cleves' pony was 'God sends no wool to kewe.' Richard Beauchamp, Earl of Warwick, Richard Henry VI. had three daughters, who all married noblemen. Margaret's husband was John Talbot, Earl of Shrewsbury, and the motto of her wedding ring, 'Til deute dequid.' Alansour married Edmund, Duke of Somerset, and her motto was 'Never new.' Elizabeth married Lord Latimer, and hers was 'Til my life's end.' An old Earl of Hartford's wedding ring consisted of five links, the four inner ones containing the following posies of the Earl's own making—

'As circles live to art compact shows but one ring is sight,
So must united faithful minds with knot of secret night;
Whose force to break no right but greedie Death
Unseweth now or,
As time and seasons will shall prove. My ring can say no more.'

Lady Cathcart on marrying her fourth husband, Hugh Macbride, in 1719, had the following posie inscribed on her wedding ring—

'If I survive,
I will have five.'

Dr. John Thomas, Bishop of Lincoln, in 1783, married four wives, and being of the same mind with Lady Cathcart he selected a like motto for his fourth wife's ring, viz:—

'If I survive,
I'll make them five.'

The community of fishermen inhabiting the Claddagh at Galway rarely intermarry with other than her own people, and the wedding ring is an heirloom in a family, and is regularly transferred from the mother to the daughter who is first married, and so passes to her descendants. Many of these still worn are very old.

The women of the gipsy tribes wear plain massive gold wedding rings, which are occasionally pawned by the possessors when in want of money, but in most cases are scrupulously redeemed. Many superstitions are associated with the wedding ring, and some of them still linger on. There was once a widespread belief that a special nerve or artery stretched forth from the heart to the ring finger, and it is not a little remarkable that this notion is derived from Egypt, so that the wedding ring of today is placed upon a particular finger because many centuries ago the Egyptian appropriated that as the ring finger, from some supposed virtue that existed in it. Macrobias writes that those Egyptian priests who were prophets when engaged in the temple near the altars of the gods moistened the ring finger of the left hand (which was that to the right the smallest) with various sweet ointments, in the belief that a certain nerve communicated with the heart.

It has been thought that the wedding ring possesses certain curative powers; thus, it is believed that a sty in the eye will soon disappear after rubbing the eye with the plain ring finger. Most women are very loth to take off their wedding ring, and it seldom, if ever, is allowed to leave the finger. It is thought to be an evil portent of some importance. In Sir John Bramston's autobiography (1631) it is related that his stepmother dropped her ring off her finger into the sea near the shore when she pulled off her glove. She would not go home without the ring, being the most unfortunate that could befall any one to lose the wedding ring, and after a general search the seekers were rewarded with success.

Among Moore's juvenile poems will be found a tale called the 'Ring,' which is a version of an old and widely-spread German legend. A young knight who is about to be married to a beautiful girl places the wedding ring on the finger of a statue, thinking it to be a place of safety. When he comes for it the marble finger has turned up, and he is unable to get his ring off. He comes again to break the finger off and release the ring, when he finds the finger gone, but the ring gone. He is in dismay, but obtains a new ring,

with which he is married. At night, however, a spectre cold, like the marble statue, comes between the bride and bridegroom. The former cannot see, but the latter sees it, feels it, and hears it speak these words—

'Husband, husband, I've the ring
Thou gavest to-day to me:
And thou'lt be to me for ever wed,
As I am wed to thee!'

At daybreak the spectre departs, but comes again each night, until, with the assistance of an old monk, the knight goes to a place where four roads meet, and obtains his ring again.

Still, in spite of these notions, the gold wedding ring is by no means an indispensable part of the marriage ceremony, for certain rings, church keys, and rings made from gloves, or leather of any kind have been used as a substitute.

Marrying with a rush ring was practised by designing men to deceive their mistresses, and on account of this abuse the practice is strictly prohibited by the constitutions of Richard, Bishop of Salisbury, in 1217.

'And whilst they sport and dance, the love-lives
swains
Compose rush rings and mysticry chains.'
—Quarles' Shepherd's Dracles, 1640.

In Greene's 'Menaphon' is the following reference to rush rings: 'Twas a good world when such simplicity was used, says the old women of our time, when a ring of a rush would type as much love together as a gem of gold; and' Does not refer Shakespeare's expression, 'Tis a rush for Tom's forgiveness,' to this custom.

There is another ring which is not so well known abroad, but which was pretty common in the fourteenth and fifteenth centuries. It was a frequent custom in the middle ages for widows to take a vow of chastity or perpetual widowhood, in token of which they received a peculiar ring and ring. Eleanor, third daughter of King John and widow of William Marshal, Earl of Pembroke, made a vow of celibacy to Edmund Archbishop of Canterbury and Richard Bishop of Chichester, after the death of her husband, and received the ring and mantle of profession in public. A few years subsequently she broke her vow and married Simon de Montfort, Earl of Leicester, and, however, before the strongest remonstrances had been made by the pious archbishop. The marriage was generally regarded as an act of void, and it was only after the greatest exertions had been made for the Pope's sanction and vast sums of money had been spent that a dispensation was obtained. In the will of Lady Alice West (1398) mention is made of 'a ring with which I was possessed to God.' In 1473 Katherine Rippington, widow advowee, bequeaths 'her gold ring with a diamante set therein wherein with she was married.' Mr. Henry Harrod, in a paper on the 'Archangels' (vol. ii, pp. 307-310), gives numerous instances of money left up on condition that the testator's wife takes a vow of chastity, or order of profession of widowhood.

Our subject concludes with the last stage of all, and connects itself with death. Mourning rings, of various kinds, have been used by men who have preceded us to the land of spirits, have always been cherished in Christian lands. Lord Eldon wore a mourning ring in memory of his wife, and desired in his will that it might be buried with him.

The practice of offering rings at funerals is introduced as an incident in 'Sir Amadas.' Anne of Cleves, who survived Henry VIII, left by her will several mourning rings of various value to be distributed among her friends and dependents. Dr. Wolcott wrote some elegant lines, very different in tone from the usually employed by him, on the Princess Amelia's mournful present to her father George III.

'With all the virtues best and every grace,
To charm the world and dignify her race,
Life's taper flame fast is being free,
My faithful thus beseech her sire:
Life's taper flame fast is being free,
My faithful thus beseech her sire:
My friend, my father, and my King,
Receive the token and remember me!

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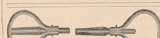
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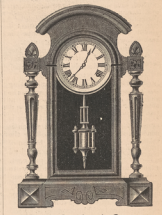
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Practical Hints on Watch Repairing.

By EXCELSIOR.—No. 2.

(17) Spiral Hairsprings are made on a tool which slightly resembles a winding arbor, one end being held firmly in the sliding tongs. Instead of a flat wheel there is a round piece of brass or platinum, one-half inch in diameter, fast on the arbor, with an nut outside to screw it up towards the first one. Between these two flat pieces a space left equal to the breadth of the proposed springs to be made. The arbor has a shoulder between these pieces, and two or three slots are carved down into this shoulder in the direction of its length, with a fine saw. Two, three or more springs are wound up at once, the number depending on the space to be left between the coils of the spring when finished. The fewer springs wound up at a time the closer the coils of each will be.

(18) The wire being cut into lengths of six or eight inches, or enough for a spring, the ends are fitted snugly in the slots in the shoulder, singly or together, the loose plate slipped on the arbor, which keeps the ends of the wire in their places, and the nut screwed up so as barely to leave the wire free between the plates. The pieces are then laid straight, and a pair of hand tongs or other weight clamped on the outside wire, which, hanging down from the winder, presses on the coils as the arbor is turned—the different wires being prevented from twisting, and occasionally pulled a little to insure close coiling. When the wire is all wound up, take hold of each piece in turn with the pliers, commencing with the one at the center, and pull gently on it to be sure that all is tightly coiled up, and fasten the end by twisting it sideways over a notch in the edge of the plate fast on the arbor, something as thread is fastened on a spool. If there is any doubt about the close coiling, pull the pieces again. Then screw the nut up tightly, to insure the coils being in a true plane, and heat the whole slowly and evenly to blue the springs, and cause them to "set" in that form. When the springs are finished, if they are to be left soft.

(19) But if they are to be hardened and tempered, they are placed either singly, or in a mass, as provided with two flat pieces of brass, provided with steady-pins to prevent shifting or sliding, and tightly screwed together, then made red hot and treated as before described for helical springs, except that the polishing is done by passing a wire through the center of each to hold it while rolling it on a polishing block of bell metal with red-stuff or "sharp." Springs should not be polished any more than necessary to obtain a clean smooth surface, lest some parts should be reduced more than others and give irregular action. It is then blued in the bluing-pan, which is simply a flat brass disc on which the spring is laid and held down in close contact with it by a piece resembling a three-arm watch balance, on the end of a lever pivoted so that it is pressed down by a spring, but can be instantly raised, or the finger on the other end of the lever. When the desired color is reached the finished spring is thrown off to cool. See coloring (12 to 16).

In making the very finest quality of the springs, a flat plate is sometimes taken and a spiral groove cut in its surface having the exact shape which the spring is desired to take, in which it is placed and set by heat. But few watchmakers have the tools for cutting such a groove truly, or are capable of using them.

(20) Some workmen make the elbow of the Breguet spring before hardening and tempering, in which case a thin strip of brass must be placed between the main body of the spring and the supplemental coil above, and the whole then screwed together for hardening. But I do not advise to use any terminal curves till the last thing, but simply make the plain cylindrical or spiral spring, and ascertain its adaptability to the balance and the proper place for the elbow or the commencement of the curve, before expending any labor on that part of the spring, which will be treated under the head of isochronism. I should have stated, in my

last article, that the block on which the cylindrical springs are hardened should be hollow so that it will cool quickly. Its thickness should be no greater than will give sufficient rigidity and strength. The thickness is generally from one-eighth to one-sixth of the total diameter of the block.

(21) These directions are not designed as a complete guide for making springs—although I have told enough, I think, to enable any who wish to experiment successfully, and some things not before published—but to give a clear idea of the process of making them as a basis for further understanding of subsequent operations. Furthermore, the workman who proposes to fit a helical spring in a chronometer will find it necessary to make one to suit. Hence instructions upon that operation must include the making of the spring, as already described. But flat or spiral springs can be bought ready-made, of almost every strength and quality, so that a suitable one can be readily selected from a fair stock of them, and thus save time and labor.

(22) The proper diameter for the coils of a hairspring is a matter of calculation in new chronometers and watches—helical springs being generally one-third and spiral springs one-half the diameter of the balance. But a certain length in proportion to its thickness is necessary to its free action, and if it is found that there is not room for that length of a helical spring, the coils being of the above-named diameter, then a spring with larger coils must be made, to secure the necessary length of wire. But the repairer should generally be guided by the old spring, if it yet remains, remembering that the new spring, when finished, will have expanded a little larger than the grooves in the block, or its size when hardened. If your wire is not of the same stiffness as that of the old spring, more or less coils than the old one had must be used, to get the same strength of spring. But generally the old spring should be copied in all respects, unless there is good reason to believe that it was never satisfactory.

(23) Helical springs have usually from nine to eleven coils, but it is well to make thirteen, to allow for testing the temper and, etc., after the spring is made. Its length can be broken off. A rather long spring is better than a short one, especially if it is somewhat soft, as the angle of flexion, and the consequent danger of setting by use, are less. A spring should be thin and hard, rather than thicker and lower tempered, both being of the same strength. For the former will maintain the motion of the balance longer (without additional impulse from the hand or the movement), and, consequently a watch with such a spring will be less affected by difference in the motive power, or friction, poor oil, jarrings, etc. The loss the number of coils the harder the temper should be, and conversely, the softer the spring the longer it must be. Hardened springs are less liable to be affected by magnetism than soft ones, and are to a great extent, but not entirely, free from the deterioration or loss of force to which all springs are more or less subject by constant action, even when the flexion does not approach the limits of their elasticity. The well known phenomenon of hardened springs slightly accelerating on their rates, for a few months after being fitted, is an example of this change of condition. In this case the springs are a portion of their excessive initial hardness, and gain in pliability and elasticity. After attaining their greatest degree of elasticity they remain nearly constant, while the deterioration of soft springs is comparatively rapid.

(24) The breadth of hairspring wire should be about twice its thickness, or rather more, for marine chronometer springs, but for pocket watches there is no regular rule. Round wire has been proposed for springs, as being more easily and perfectly made, but there can be no doubt that unnecessary thickness in the direction of flexion should be avoided, and greater stiffness, by increasing the breadth rather than the thickness. Experience indicates that a breadth of from three to four times the thickness is a good proportion for flat spiral springs for watches.

(25) As to the proper number of coils

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for spiral springs, the custom is to use from nine to twelve in English lever watches, generally about ten; in the Swiss, eleven. For a diameter of eight or nine inches. The Swiss, in their cheap watches, often use fifteen to eighteen coils—as the springs, being of soft wire, must necessarily be long to prevent bending or breaking. But this only preserves them for a time, and in a few years they frequently need re-springing in order to do even decent service.

(26) I will now give the ordinary method of fitting a plain spiral spring, followed by good workmen, and then describe my own method and tool for facilitating the work. It is not to be expected, of course, that pains will be taken to make the hair-spring perfectly isochronal, when the workman gets only 81, (which is the price in many places,) for fitting and regulating it. Nevertheless he should have some regard for his own reputation, inasmuch as it will be but little more trouble to approximate very closely to correctness, if he knows how, than to fit the spring in such a manner as to render its good performance impossible. He will therefore understand that the directions to be given in these articles are essential to success, although I omit any description or explanation of the reasons therefor till we reach that part of the subject relating to isochronism.

(27) All tools used in working around hairsprings must be kept perfectly clean and dry, not allowed to become magnetized, nor touched with soldering-fluid or corrosive substances, nor should any such things be allowed upon the watch bench at all. Their place is upon the clock and jobbing bench. A pair of fine tweezers must be kept solely for this use. The points should be very slim and thin, flat and rough on the inside, hard tempered, the jaws broad and firmly connected so they cannot yield sideways and let the points pass each other, and made to come easily together without giving any more spring or stiffness at the points than is just necessary to hold the spring or the pin. Too much strength is the cause of pins snapping away and other "accidents" that bother the beginner, who imagines that the tweezers should not only carry the pin to its place, but hold it firmly enough to force it in. They must not be heated and softened, nor used as a pin punch, for picking teeth, cleaning finger nails, prying off watch dials, or corks out of oil bottles, or picking the sawdust out of eyes, nor for anything whatever except working upon hair-springs. But if the points do accidentally get injured it will be a saving of time to put them in perfect condition again before you undertake to work with them. The same remark applies equally to all other tools. There is no surer sign of a good workman than that his tools are always in perfect working order.

(28) A spiral spring should be perfectly flat, evenly coiled, the coils becoming more distant from each other as they proceed from the centre, being about twice as far apart at the outside as at the centre; the wire should be of an equal temper, length and thickness, throughout its whole length, well polished and free from rust. It should also be long and closely coiled.

(29) The diameter, as already stated, should be one-half that of the balance. If a spring cannot be found of just the right size, or larger, one of smaller diameter but having a suitable number of coils may be enlarged by the following process, which is also useful for spreading apart springs when they are so close together as to be liable to interfere with each other. Put the spring on a flat plate of either steel or brass, and over it another thin plate of bright metal, or, if of brass, with a hardened steel screw in the centre. Heat the whole very slowly and evenly till the top plate or the color-piece becomes blue, then let it cool and it will be found equally expanded, unless the top plate has been too heavy to allow of free motion. If not sufficient it can be treated in the same way again—as the temper will not be reduced any lower, provided that the heat is not at any time greater than will blue the hardened bright plate or color-piece (14).

(30) If a spring has been warped or bent out of flat, it may be flattened in a similar way, by fastening it tightly between two glass plates so as to prevent expansion, and blue the upper plate, which will cause the spring to "set" perfectly flat. But in all these cases great care must be taken not to exceed the limit heat, or, if the spring is of any other color, not to carry the color of the hardened color-piece beyond the shade of the spring.

(31) If the centre of the spring has been merely sprung up, the best way is to take the collet off the balance and slip it on the pin punch till it fits snugly, then take hold of the outer coil, or of the coil where the "bulge" commences, with a stiff pair of tweezers so that it can be firmly held horizontally, then push the centre with the pin punch, in a direction exactly vertical to that in which you hold the outer coil, and the spring can generally be sprung back so truly as to be as perfect as ever, and with very little trouble.

(32) If a spring has been very much distorted, it probably cannot be made perfectly true in the coil, although it is may be true in the flat, and if it belongs in a fine watch another spring should be fitted. Even if a distorted spring should work with the watch, the few minutes it was restored to exactly its former shape, it would not act the same as before. Every place where it has been bent and restored will be of a different stiffness from the original, and every such place exerts a disturbing influence, rendering a uniform action of the spring impossible. An inexperienced workman will often render a spring worthless for fine time keeping simply by numerous changes and corrections of shape. A spring should not be bent or altered any more than it is absolutely necessary, and any changes of shape should be made by little, rather than by bending too much and then having to bend part way back again. The injury caused by bending is greater in soft than in hardened springs. Hence Frequent springs should always be hardened because they are less likely to be bent more or less in perfecting the terminal curves.

(33) In fitting a new spring, the first thing is to ascertain the number of vibrations the balance should make per minute, either by counting the vibrations of that watch, or by one of the other methods. Or it may be done by calculation. As the center wheel revolves once per hour, we multiply the numbers of teeth in all the wheels from the center to the escape wheels, inclusive of both, into each other, and divide that result by the product of the numbers of the leaves in the pistons of all those wheels (except that of the center wheel), then double the quotient, as there are two vibrations to each tooth of the escape wheel. This gives the number of vibrations the watch makes in an hour, and dividing that by 60 gives the vibrations in one minute. Generally Swiss watches have 1800 or 1920 vibrations. American watches 2000 or 270, and English levers 240. Whenever there is a doubt, or the watch is of an unusual make, it is well to count up. If you have a movement which makes precisely the desired number of vibrations you need only try your spring alongside of that, as described in (26), and any divergence between them will be seen at once, without counting.

The Xenia (Ohio) Telegraph relates this little story: "An old gentleman living near here, was called upon a short time since by a clock maker, who examined our old friend's clock and pronounced it out of order. The old gentleman told him that it was good money for the old woman, and he would not have it fixed, but it was insisted upon, and finally he agreed to keep the tinkering and his horse all night in recompense for the necessary repairs to the old locus coelestis. The clock proved to need more repairs than was at first expected, and in addition to the alleged repairs, the tinkering cost him twenty-five cents. The old gentleman objected to this, and began to count up what he had already given his tinkering. 'First, the horse was my own—' But stop," says the tinkering, "you asked me to set my eyes, and consequently I can't charge for that." Says the old man, "You asked me to fix my clock, consequently you can't charge for that." Says the tinkering, "I set the spring and, you owe me for your lodging and breakfast. The old man was ahead." The matter was finally compromised by the old man paying twenty-five cents, and the young man departed muttering something about Grangers."

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Curiosities of Clocks and Watches.

By EDWARD J. WOOD.

The English watchmakers of the seventeenth century became so famous in their craft, that lest inferior articles should be sold abroad as their productions, a law was passed in 1698 obliging all makers to put their names on their watches.

Lady Fellows has the following watches, all of which are of the seventeenth century.—A silver watch, the outer case of which is in the form of a skull; on the back is hour-glass and the words, "Incerte hora," "Eterna respicio," and other sentences. The case opens at the lower jaw. The maker was J. C. Vaoli. A silver cross opening to contain a watch, but the works are absent. The numerals are engraved, and outside is a lamb engraved; at the lower end is a seal, marked with the sacred monogram. A crystal-cased watch by Jean Rousseau, in the form of a cross, with gilt engraved dial-plate and small silver dial, with a landscape in the centre. An oval metal-gilt watch by John Wright, engraved with sacred subjects and inscriptions; round the side is a silver band of scriptural subjects, and inside the lid the crucifix and the offerings of the Magi. A gilt-metal oval watch, with a silver bell, inscribed "Vigilate et orate, quia nescitis horam." It has an engraved dial-plate, with a landscape in the centre, and a silver ring with numerals. A metal watch-case in the form of a book, the cover being pierced to show the hours marked on the dial. A square table-watch, with iron works and gilt dial-plate, fitting into a silver case. An oval silver tulip-shaped watch by Thomas Hunkle, the projecting leaves being chased in a chequer-board pattern. The silver engraved dial has a landscape in the centre, and a crystal face. A large round watch-case without works; it has a bell, on an engraved dial-plate, and a pierced tank and ring of arabesque scrolls. A round silver repeater and alarm watch, with a pierced dial, engraved side, of Bacchus and a caduceus and flowers. It has a silver dial with gilt centre, and an outer shagreen dial. A round silver repeater and alarm watch by Piquet, a Rennes, with a silver gilt-centred dial plate. A round silver alarm repeater watch by Elias Weckerlin, a Zug, with pierced flower back, silver dial, gilt centre, and a steel key. A small round silver watch by J. B. Viseur, a Zug, with a steel band, and an engraved silver dial-plate. A crystal-cased watch by Aymé Noel, carved with fluted rays, having a silver dial and enclosed in a silver outer case. An oval crystal-cased watch by Croymarie, carved with cross-lines and pellets, engraved gilt face, and silver dial. A round silver watch-case, chased with vertical and curved lines and flowers between, with a silver dial. A small oval silver-gilt plain watch by Robert Grintkin, London, with crystal face and silver dial. A large oval repeater-watch, with metal open-ear side round the bell, silver back, small silver dial, and the name on the back is "Hicromet." "Grosboudin." An oval metal repeater-watch, with pierced back, small silver dial, and landscape in the centre. A large silver repeater-watch by Jean Vallier, a Lyon, with pierced fluted ornament and white enamelled dial-plate. A round silver watch by Henry Tordil, of Ipswich, with chased interlacing bands, and silver dial. A round silver watch by Louis Herve, with fluted rays and white enamelled face. An oval silver watch by Dupont, a Caestre, with engraved side, of birds and squirrels; engraved dial plate with indexes to show the hour, day of the week and month, age of the moon, and constellation; inside the cover is fitted a sundial, with box for a compass. An oval watch by G. Bonard, with open gilt-metal sides, silver back and front, and inside the cover is a sundial without the gnomon; the dial-plate is engraved with cherub, birds, and dogs, and has a silver ring with numerals. An oval gilt-metal watch by Papus, a Rennes, in plain case,

with gilt dial-plate, and silver ring of numerals. An oval silver watch by William North, of London, with gilt face, and two dials showing the day of the week and month, the hour, and the age of the moon. An oval metal repeater-watch by W. O. Cousins, a Antum, with plain case and pierced side, and a gilt chateleine with filigree centres. A plain oval metal watch, with black numerals and steel hour-hand, and no minutes. An oval metal watch, with engraved silver band round the side, silver dial, engraved with Time, Venus, Cupid, and Amor, with gilt border. An oval metal-gilt watch by Augustus Portford, Sedan, with plain case, silver ring of numerals on gilt ground, and steel hour-hand. An oval silver watch by G. Gillier, a Berne, with engraved borders and centre subjects, silver ring of numerals on dial-plate, and landscape, and chased border. A round silver repeater alarm-watch by Collet, a Romen, with pierced fluted side, and silver dial, showing the hour and days of the month. A round silver watch by John Drake, in Fleet Street, with plain outer case, silver dial, and steel band. A round silver repeater-watch by Chamaelaine, of Chelmsford, with pierced flowers at the back, and silver dial, showing the hour and days of the month. A watch made up by "Thos. Chamberlaine, de Chelmsford," with silver dial. A silver-gilt octagonal watch by Leonard Pagon, a Gnan, in plain case, with silver dial, and no numerals. An octagonal silver-gilt watch by Josias Jolly, a Paris, with engraved border, and landscape in the centre of the face. An octagonal metal-gilt watch in a plain case, with crystal face, and small dial; on the back is a pommel which projects below the case. An octagonal metal-gilt watch, the case being pierced at the back with geometrical ornaments; and in front with the Aquas Dei; the dial is inlaid with enamel flowers. An octagonal crystal-cased watch by Pattru, cut in diamond facets, and engraved dial with Cupid and flowers. An octagonal metal-gilt repeater-watch, with pierced back, engraved borders, and inlaid enamel dial. An octagonal metal-gilt repeater-watch, with pierced back, in diamond ornaments, open sides round the bell, and silver dial with black Roman numerals. An octagonal gilt repeater metal watch, with maker's initials G. H., pierced ornaments on the back, front, and side, and inlaid silver dial, with a smaller gilt dial in the centre. An octagonal silver watch by Jere Johnson, of Exchange Alley, engraved with scrolls, crystal face cut in diamond facets, and silver dial with gilt border.

The following watches also of the seventeenth century belong to the undermentioned persons—Messrs. Farrer have a French gold watch, the case of which is painted on enamel, with the Holy Family and other sacred subjects. Also a gold watch by Theodore Girard, of Blois, the back and dial of green translucent enamel white border, and engraved with flowers. Mr. George Field has a square gilt pocket watch by Ferrer, with enamel, with figures of Faith, Hope, and Charity at the angles; and another with two small enamelled busts of the electors of Germany on each side; four Cupids at the top set all over with garnets and diamonds; resting on a base supported by four eagles and garlands between. The height is two inches and three-quarters. Mr. S. Addington has a round watch, with a painted enamel case of Venus and Adonis, in an outer case of leather ornamented with gold studs in flower patterns. Also a circular-enamelled watch by Stieler, a Berlin, painted with the Rape of Europa, and portraits round the edge. Also a circular watch, with enamelled painting of Mars and Venus. Also an enamelled watch with a portrait of William III. on horseback at the battle of the Boyne in front. On the dial is painted St. George and the Dragon. It is in a gilt perforated outer case. Also a watch of quartz foil form, with a ring of ruby enamel in the centre; round the side are stone medallions with blue enamelled frames; resting on a swivel frame silver-gilt chased with masks and dolphins.

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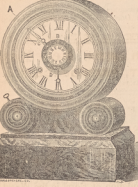
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Watchers of the Watchmen.

If watchmen habitually neglect their duties, fatal results may be looked for. Many cases of burglary and fire are continually occurring which may be directly ascribed to a neglect of the persons in charge, whose business it was to patrol the premises, but who became derelict in their duties.



It is not strange therefore that the ingenuity of many inventors has for some time been directed to means of recording the visits of the watchmen to certain localities. Many devices have been proposed and used, and among them stand prominently Silver's Watchman's Clock and Time Detector, of which we here give an illustration; it is to be placed in the room, shop, office, etc., to be visited by the watchman. A is the clock complete; B is a slate edged sub-dial attached to the centre post of the clock, and also to the hour hand by the wire C, which is curved so as to allow the free passage of the minute hand under it; D is a small hole in the glass covering the face of the clock, large enough to admit the end of a white pencil; a number of which are furnished with each clock.



The operation is very simple. The watchman is directed by his employer to make a mark every hour, half hour, or other period of time, which is done by passing the pencil through the hole in the glass against the slate. The time of the sub-dial opposite the hole always corresponds with that of the clock, so that the slate edge of the dial will show the exact time at which a mark was made upon it. In the cut marks are seen each hour from 6 o'clock. We will suppose the clock to be running: If the watchman were not to make his mark, the disk would show that it was made at half-past 10, which is the time of the clock. If he takes a pair of a couple of hours, or in the morning makes a mark at 10 o'clock, which he neglects to mark at the proper time, he can not do so afterward, as the disk is attached to the hour hand, and revolving with it, that point is carried past the hole and in the morning reveals the truth to the employer.

It is self-evident that this clock can not be tampered with, as the door is secured by a tumblers lock, which can not be picked. No two locks are alike, and there being but one key to a lock, and that carried in the employer's pocket, the watchman can not duplicate it.

Some watchmen detectors have keys fixed on the different floors, and the timepiece is carried to the key for marking. These keys being in the possession of the watchman all night, there is always danger that he may tamperly duplicate a set from a pattern, carry them with him, and use the detector at all points in a neighborhood, or wherever he pleases; but this detector is served from the inside to a fixed position, and is an unerring sentinel.

Another style of detector is arranged with wires running to it from the different floors, these wires being nearly always out of order, and the watchman takes care to keep them so. The Silver's detector is constructed in the most simple and durable manner, does not interfere with the running of the clock, and can be got up in order. Another objection to most detectors is their price, which varies from \$75 to \$100, while this one costs but \$15. The clock runs a week, and is warranted a first-class time-piece.

It is a reverse view of the sub-dial B, showing how it is attached to the clock; F is another style of sub-dial used in the same manner as B. It is in some cases containing a paper dial, clock being furnished with enough to last a year.

The marks are made on this with a lead pencil. In the morning the paper dial is taken out, (which can be filed as a record of the watchman's direct) a new dial put in, the clock locked, and all is ready for the next term of the watchman. When the disk D is used, all that is necessary is to wipe the marks from the slate edge; in doing so it is best to take it off the clock. In replacing the paper dial E it can be taken to have the wire printed on it point toward the wire, and to place the wire in the groove made in the corner of the back of the brass case.

No business concerns employing a watchman should be without one of these. Properties of stores who wish them opened and closed at certain hours in their seasons should have them. The time of the clock can be seen as well with the detector attached as without it.

As the price is so low and full satisfaction is guaranteed, we do not hesitate to predict a favorable patronage for these time detectors. Watchmaker who further information may be obtained from the Silver & Governor Company, Biddishead, Pa., or their agents, *From the Manufacturer and Builder.*

Trade Societies.

To the members of the Horological Club:

Gents—Since the issues of September and October last, I have not had the pleasure of reading anything further about the prize-winning subject of establishing a Watchmaker's Society. I hope that Messrs. James Fricker and "Clyde" have not entirely abandoned their project. Every right-minded and conscientious watchmaker knows too well, that it depends entirely on the co-operation of the craft to protect themselves and the public from being swindled by incompetent workmen. The people in my neighborhood stand in such dread of these impostors, who are infesting the country places all around here, that they prefer to have their watches stop rather than trust to the chances of having them spoiled, not leaving them in the hands of a workman and a watch. It is a difficult matter to obtain more than \$2 for any repairs of a time-piece, no matter what is required, as the people think they are going to be swindled any way, and the less they risk, the better for them.

A case in point came under my observation recently. A watch was brought to me which had been repaired in Findlay, Ohio, and on asking about it, I found some holes had been trying to make a new balance staff by soft soldering a piece of steel wire in the centre hole of a balance, and leaving solder enough both above and below the balance to fasten the hairspring coils and form a shoulder for the table roller. Then he filed the pivots by hand, and as every thing, both staff, and table roller, was true as a hair, the head's wheel with two centres stuck in, he had to file the fork to make room for the balance and stop pins. Strange of all, the watch would actually run for a short while. His charge was only seventy-five cents.

Another case is where a customer brought me a watch which had been repaired by a certain watchmaker, who had put a new pinion in the third wheel. The pinion was of proper size, but the gears were positively square and rounded, and too large for the jewel holes, which had to be splintered in order to admit the pivots. This no watchmaker in many country districts who can do more than brush a watch, and there is nobody near or far, who could replace an escape wheel pinion, a cylinder, or any thing like that. One individual I know, found a wheel depth bad, and turned the wheel down, which already was too small, and in such a manner that it did not touch the pinions at all.

To remedy this state of affairs, it would be necessary to form a Club in every State, which might lead monthly meetings, to grant diplomas to applicants after a proper examination, for which they would be required to give composition. These diplomas could be framed and hung in some conspicuous place in a man's establishment, and the public could be informed through the papers, who possessed such a diploma, and while protecting the public from them more respected, it would also protect the public against being swindled. And it would no longer be said that all watchmakers were swindlers, for the public at large, who know nothing about the inside of a watch, gets its impressions more from how it is treated by the bodies, than how it is treated by honest watchmakers, and as soon as it became known publicly that diplomas were obtainable from some respectable and responsible authority, it would be natural that an individual who had a watch to be repaired, would not leave it with a man who could not produce a diploma and could not use the watch exactly. People would be attracted only to the fine show windows and glaring signs, but it would quickly learn to patronize the meritorious workmen.

I have explained myself in support of the establishment of such a society as best I could, and I call upon every right-minded watchmaker to give the project of establishing such a society for giving diplomas to deserving watchmakers, this zealous support, as a proper protection to the gathering of the fruits of our honest labor and the establishment of that respect in the eyes of the public, which is one of the rewards of honest effort, and at the same time the true means of the public would deserve a due share of consideration. Apologies for this long and tedious composition of my communication, I am

Yours respectfully,

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HISTORY OF THE GLYPHIC ART.

By C. W. KING.

As regards the materials appropriated to itself by the Glyphic Art amongst the Assyrians, it is apparent, from the numerous specimens of their jewelry still preserved, that ancient Egypt was not the Egyptians were as yet acquainted with the true "precious stones," the exclusive productions of India. The first rank with them for rarity as well as for beauty was assigned to the lapis-lazuli and the common amethyst; gems supplied to them by the veins of their own mountains, or by the tools of the torments issuing therefrom. But of the Tyrian merchant the jewel-casket was far more richly furnished, and that, too, at a period anterior to Nebuchadnezzar's invasion of his country. The prophet Ezekiel calls up before our minds how the merchants of Saba (South Arabia) and of Raema brought to the market of "the renowned city that was strong in the sea" all manner of spices, of precious stones, and of gold. These caravans from South Arabia had doubtless brought with them the choicest exports of their Indian neighbors; and that these included every species of the true precious stones we are assured on the testimony of the evidently well-informed Dionysius Periegetes, writing some four centuries after the times of the prophet. All of them, even including the diamond, are named by him as gleaned by the Ariani of Parapamius from the mountains of their own great empire. The Hebrew poet, in his gorgeous picture of the Prince of Tyre: "The anointed chieftain that covereth—thou that sealest up the sun, full of wisdom, perfect in beauty, set him before us as blazing in jewels; "Thou hast been in Eden, the garden of God, every precious stone they thy covering, proceeding to enumerate the emerald, topaz, and jasper; the chrysolite, onyx, and beryl; the sapphire, carnelian, and the like. Or as Jerome more truly renders the passage, the Prince is termed "signaculum similitudinis," "the impression (or seal) of the Divine image;" he also says "chrysolithus" (*chrysolite*), where our version has "diamond;" and his authority as to the Latin equivalents to the Hebrew terms of the sort is derived from the circumstances of his times and opportunities, of the very greatest respect.

Before quitting the subject of material it may be appropriately added here, that in the age of Alexander, the Greeks already possessed as the descriptive list compiled by Theophrastus puts beyond question all the true precious stones except the diamond, including the real Indian ruby. Even without his authority the inspection of the Etruscan and Greek jewelry, brought to light of late years, would tell us as much, for these relics exhibit unmistakably, though minute, specimens of the native ruby, sapphire, and emerald.

The affinity between the Assyrian style of design and that of Archæic Greece was exhibited in all its remains, cannot but strike every one who examines each with intelligence. The subjects, for example, that decorate the earliest Greek vases, the sole existing specimens of the painting of their times, are purely Assyrian both in name and in treatment. They consist entirely of sphinxes, gryphons, harpies, and similar composite monsters such as were being contemporaneously depicted on the walls, "painted in vermilion," of Susa and Persæpolis.

In this branch, therefore, of art, the parentage of the Grecian is sufficiently obvious; that of the special subject of this inquiry shall be indicated in its proper place. Neither must it be overlooked that the going upon ancient traditions, asserts that Grecian sculpture in marble (in contradistinction to the more ancient *statuaria* in bronze) was invented by Scyllas and Borelides, in Cyprus, while that island still belonged to the Persian dominions. There is therefore nothing to surprise in the Persepolitan air of the Metopes of Selinus, or even in much of the Eginetan marbles.

It only remains to be noticed here that the Greek art of vase-painting became known to the Etruscans at an early period

of their establishment in Italy as a distinct art-form, a fact shadowed forth in the legend concerning the two companions of Demaratus upon his emigration from Corinth to Tarquinii; they were the poets Euripides, and the potter Encheir. Nevertheless the Etruscans found it more convenient in general to make use of the Grecian manufactures, which may either have been imported as an article of commerce through Tarquinii, Ardea, and other maritime towns; or else (a theory serving better to explain certain existing facts) the ware was made in the country by a colony of Greek potters there domiciled, particularly in the district about Vulci. Properly value far below the rest, and inscribed with legends in the Etruscan language. Such examples, when they do occur, supply a trustworthy criterion for distinguishing between the Greek and the Etruscan fabric. Out of the innumerable vases found at Vulci, not more than three according to K. O. Muller present indubitably Etruscan inscriptions; and the total number of such known to exist, says Milingen, amounts only to seven. A singular contrast this to the lesson taught us by the bronze mirrors, that specially national Etruscan work, where a Greek inscription amongst the hundreds of Etruscan now collected, would form, if ever discovered, a most interesting exception. The Etruscans were the great metal-workers of the ancient world, favored as they were the possession of the inexhaustible copper-mines of Monte Catini. Even in the age of Socrates they maintained their pre-eminence for the making of gold plate and of all of those vessels required either for domestic use or ornament," as his disciple Critias informs us in a fragment of a poem preserved by Athenæus. In the latter manufacture they continued to compete with Greece long after art had been fully perfected there, for Horace alludes to the "Tyrrhena sigilla," or bronze statuettes, which were held in high estimation by the dilettanti of the Augustan age as now by those of our own. These, too, were the *Signa Tuscanica* of Pliny, mentioned by him as then diffused all over the civilized world. Besides, the Etruscan statuettes were capable of the boldest flights; the same author cites the famous Apollon, fifty feet high, standing then in the Palatine Library; and is at a loss which most to admire, the excellence of the workmanship or the beauty of the metal.

But to return to gem-engraving. The Egyptians did not generally adopt the improved but more laborious process by this time established in the ateliers of Nineveh or Babylon, but continued the practice of carving or chiselling on their rude hieroglyphics upon the softer materials until the times of the Ptolemies. The signets of their kings and great men were engraved in gold, those of common persons in silver. In some circumstances, a fine limestone and steatites of various colors, and in the manner already mentioned, also in the form of the Apollon, fifty feet high, standing then in the Palatine Library; and is at a loss which most to admire, the excellence of the workmanship or the beauty of the metal.

This new method of rendering available for signets even the "hard stones," although neglected by the Egyptians, was speedily taken up by the ingenious *Phoenicians*, the allies or tributaries of the Assyrian and the Persian kings. In attestation of this, many seals are found, Egyptian indeed, in form, being scarabæi, but purely Phœnician in style and subjects, though of a very early date, and being assigned to the Semitic character, of which that people were the first inventors. There are even some cylinders known that, from similar reasons, must be assigned to the Semitic character. Their traders may have diffused the knowledge of this as well as of other decorative arts amongst the Etruscan and Italian Greeks. Homer alludes to the Tyrian merchant-ships voyaging about amongst the islands of the *Ægean sea*, and trafficking in ornaments and jewelry with their inhabitants.

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To the Retail Jewelry Trade.

So general is the present business depression, that it is but reasonable to suppose that the sale of the smaller and less expensive articles of jewelry, will for some time to come be much larger than usual. You can have nothing more staple or safe of sale, at a fair profit, than a well-sorted stock of moderate priced Gold Rings. For 20 years we have made a constantly increasing variety of *Hard Solider Rings*, which we have always warranted, and which have never disappointed any purchaser. The market has lately been flooded with cheap plated hard solder and low karat Solider Rings, which many buyers have held in great esteem, because they could obtain a large quantity of them. The result has been, in many cases, that the retailer has become disgusted with all hard solder rings, and no longer keeps a respectable stock of them. We want you to know we still make nearly 400 patterns of hard solder rings, of every variety of style for men, women and children, and that they are struck from 10 karat stock with 10 karat filings, and put together with solid gold, solid silver, and that every ring is as well finished as the best Diamond work. They are all stamped and warranted to give entire satisfaction, and we ask of you to make a trial of them, assuring you that they are the silver hard solder ring yet made, and confidently appealing to scores of the most careful dealers in the country for confirmation of our assertion.

We also offer a long line of solid 14 karat Crown, Amethyst, Coral, Roman Enamelled and Engraved sets, together with many other goods in our line, so low as any other Manufacturers in the land. Respectfully, BRYANT & BENTLEY, Manufacturing Jewelers, 12 Maiden Lane, New York. January, 1875.

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The Problem of the Diamond.

The chemistry and mineralogy of the diamond has for a long time been a subject of great and curious interest. It is one of the familiar facts of science that diamond is composed of the same kind of matter as charcoal, coke, and the substance known under the name of graphite, plumbago, or black lead. In fact, all of these bodies, when burned in oxygen gas, are converted into carbonic acid and are shown to be pure carbon. The conversion of one of these forms of carbon into the other, and especially of the commoner ones into the precious gem diamond, has long engaged the attention of chemists; but without success so far as the latter is concerned. It has, however, been found possible, by various processes in the laboratory, to convert ordinary charcoal into graphite, but only by indirect means. Thus, for example, when combined with nitrogen and an alkaline metal, to form a cyanide, the decomposition of the latter at a high temperature, in the presence of a fused alkali and an oxidizing agent like niter, liberates the carbon in the form of graphite. Again, molten cast iron holds in solution carbon, derived from the fuel in the furnace, a portion of which sometimes separates from the iron in cooling in the shape of crystalline plates of graphite. The elements boron and silicon, which are closely related to carbon, have been obtained in crystalline forms related to diamond by processes involving a very high temperature; but this, it has long been asserted, destroys diamond, transforming it into graphite or into a coal-like matter, so that the hopes of obtaining diamonds by any such process would seem to be negated. Not long since, however, it was announced that the change of diamond by heat was only apparent. Diamonds which, by exposure to the prolonged heat of a gas blow-pipe, had apparently been converted into a black coal-like substance were found to be only coated over with a deposit of carbon from the flame, and, the crust being removed, the gem was found to be still unchanged.

Very lately, however, Gustaf Rose, of Berlin, has reinvestigated the matter. A diamond may be partially burned in oxygen gas without changing the remainder. The slow melting or dissolving of the gem which takes place in this process develops, however, on its surface regular depressions, which are related to the crystalline form of the mineral, and represent one of its secondary geometrical forms. If the air be excluded, the diamond undergoes no change at the temperature of melting cast iron or in the greatest heat of a porcelain furnace. At a higher temperature, however—such as that produced in a Siemens gas-furnace, where pure wrought iron is molten—the diamond begins to suffer change and is converted into graphite. Rose, moreover, has found that crystalline graphite is a substance less combustible than diamonds. Its resistance to combustion, as is well known, is so great that melting-pots for the steelmaker are made of it.

The origin of graphite in Nature has been a subject of much speculation. The free carbon of the older crystalline rocks is in almost if not in all cases found in the form of graphite, and Dr. Strevé Hunt, in his studies of these oldest rocks—the so-called Laurentian series of the Adirondacks—has pointed out that the graphite not only occurs in beds, but crystallizes in veins under such conditions as to lead to the conclusion that the carbon was taken into solution and deposited again, precisely like the various spars and minerals

with which it is associated in the vein-stones.

The origin and mode of formation of the diamond is, however, a question still involved in doubt and obscurity, and this is increased by the singular fact that it has never yet been found in its original bed or native rite. The ruby, the sapphire, the emerald, the topaz, the hyacinth, and, in fact, every other crystalline mineral known has been found imbedded in some veinstone or rock, where it was evidently formed; and if we find these gems in sand or gravel, as is the case in India or in Brazil, we have no doubt that they came from the wearing down of these rocks—a process in which the harder crystals have escaped, though often not without a partial abrasion of their surfaces. The most diligent search has, however, failed to detect the diamond in any such rock. The well-known desire of mineralogists and geologists to get some clue to the original associations of the diamonds has even stimulated fraud, and diamonds have been ingeniously cemented into cavities among crystals of quartz in such manner as to suggest that the original matrix of the gem had been discovered. In a specimen of this kind from Brazil, which the writer saw, the application of a solvent showed that the diamonds were only held in their place by some artificial cement, and the precious specimen was at once deprived of its scientific value.

A year or two since mineralogists were, therefore, greatly gratified to hear that a Russian mineralogist, Von Jernow, had solved the problem. It is well known that diamonds are found in the sands of the Urals, and this observer declared that he had found the matrix of the gem in the mineral known as xenophyllite, a crystalline foliated mica-like silicate, which is found in that region, and which he declared to be full of microscopic diamonds. There was nothing at first sight improbable in this. Crystals of imbedded minerals are by no means uncommon. Thus the mica of Haddam, Connecticut, sometimes encloses small and beautiful crystals of garnet, and elsewhere tourmaline crystals are found similarly imbedded. Small specimens of the mineral, from which were distributed among mineralogists, mounted on slides for the microscope, and the writer was permitted to feast his eyes upon what, under a high magnifying power, seemed to be numerous well-defined and brilliant crystals of diamond, imbedded in the transparent xenophyllite. But alas! for the delusions of the microscope when in unskilled hands or when looked into only by unskilled eyes. We have known minute air-bubbles to be mistaken for entombs by too credulous physiologists, who anxiously sought the latter by the aid of the instrument; and we are now informed that the minute diamonds of Von Jernow are not more substantial. Prof. Knop, who has lately submitted the supposed diamond-bearing xenophyllite of the Urals to a chemical and microscopic examination, asserts that they have no existence, and that the forms supposed to be diamonds are small empty cavities in the mineral, from which previously existing crystals of some other substance than diamond has been removed by solution; and he has moreover, succeeded in producing the same appearance by submitting what seemed homogeneous portions of the mineral to the action of an acid, which removed the imbedded and soluble crystals.

The diamonds of all parts of the world are, as is well known, found in gravel or sand, sometimes recemented into a rocky mass. But they are associated with various other crystalline minerals—such as tourmaline, etc.—evidently derived from the ruins of crystalline rocks; and we may confidently expect that sooner or later the true matrix of the diamond will be found in a crystalline rock. It should be said that, although diamonds have been found in Brazil imbedded in a sandstone, this stone, this is regarded as only a reformed and cemented rock.

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nious frauds to evade or befoul the testers at Goldsmith's Hall, not to speak of the possibilities of direct corruption of its employees. Mr. Streeter, the celebrated London jeweler, placed at the disposal of the Society of Arts, it will be remembered, a prize of £25 for an essay on this subject, with suggestions for an improved system. Of the seventeen essays sent in, none were sufficiently comprehensive to gain the award, and so the offer is now renewed. These essays were to be sent in by the first of this month, and it was suggested that they should treat of the following branches of the subject:—

a. The history of hall-marking in England, showing, with some degree of detail, & the processes adopted and now in use.

c. The merits and demerits of the present system, and how far it meets the wants of the public on the one hand, and satisfies the manufacturer on the other.

d. If any system is desirable, what should it be, and by whom and under what authority should it be carried out?

e. The system in use in foreign countries, and how far they meet the wants both of the public and the manufacturer. The American trade will await the publication of the prize essay with interest, for it will undoubtedly throw much light on the question it is now discussing. The loose state of our public service, in comparison with the English, could scarcely make successful here what is thought to be in great measure a failure there, and yet some protection is needed against the fraudulent already too prevalent. We look to the wise heads of the trade to suggest some system which shall avoid the English difficulties while meeting the American want.

Memorandum Orders.

The decision of the Court of Appeals in the important case of Geo. Weyman, the John street jeweler, who, it will be remembered, obtained several thousand dollars' worth of jewelry on memoranda, and then fled to California, has been rendered. It affirms the judgment of the courts below, and nothing but a pardon, escape, or escape now save Weyman from serving the five years' term in State Prison to which he was sentenced. The important question was whether the nonfulfillment of the implied conditions of a "memorandum order" constituted larceny within the meaning of the law defining that crime. Transactions similar in nature to the memorandum orders of jewelry, are frequent between nearly all the jobbing and manufacturing firms in all kinds of business, and hence a large class of tradesmen have anxiously watched the judicial determination of the legal issue in that case. Henceforth it will be understood that when one tradesman delivers to another goods to be shown to a customer, or the latter for sale, a failure to return either the goods or their schedule price within a given time, is stealing, and subjects the delinquent operator to the same penalties as a felon. Hiram Kraft, who was jointly indicted with Weyman, also received a similar sentence. Messrs. Kuhn and Doeringer displayed great relief for following these accretions up.

Trade Cossip.

Lockets and pendants have almost entirely superseded bracelets.

45,000 masonic badges were sold on the day of the dedication of the Temple.

The city is overrun with mock action jewelry and fools who support them.

It is estimated that there were over a million dollars' worth of coral obtained last year from the Mediterranean by the coral gatherers of Naples.

Next to much worn by ladies in mourning as in color. In shell there is a special demand for fancy comb, the finest being made of the rich tortoise shell.

Mr. Peterson, of the firm of Baldwin and Peterson, and M. E. Bissinger, were passing in the streets of London, which left for Europe on the 25th inst.

The watch case factory of Desire Bourneise, in Milford, Pa., was entered by burglars on the evening of the 16th ult., and a large number of finished watch cases stolen therefrom.

There is a revival in cameo stones of the antique and Egyptian designs. They are made for both ladies and gentlemen, and some of the patterns are very beautifully cut and set.

Edward Watson, who was charged with stealing a diamond ring from Randall, Baremore & Co. was tried in the Court of General Sessions. As there was no legal proof against the prisoner, he was discharged.

A \$1,000 diamond was stolen from the bill of a sword of Gen. Sheridan's at his house in Chicago the other day, and he suspects a man pretending to be a New York Gaiety artist of the crime.

The King of Italy has presented the Crown Princess of Germany with a set of jewels. The diadem is in the latest Greek style, after the pattern of the celebrated Stephanos, in the collection of the Marthe Compu, and the earrings according to the same original.

There is at present at the Paris Mint enough of gold ingots for the coining of 20,000,000 francs in pieces of twenty francs. There is also a great abundance of silver, and it can almost be said that the metal taken out of the country by the war indemnity, has completely re-entered France.

Italy promises to send to the Centennial Roman jewelry, Moscovite, coral, and shells, Genoese flagrant wares, Venetian glass, Florentine porcelains, Inlaid and carved woodwork, scientific instruments, etc. A country justly claiming eminence in the above specialties, is entitled to a better showing than the objects of casidies and beggars, by which she is now mainly represented in American cities.

A lady has just brought an action against the Parisian Jeweler Bloch, from whom in 1893 she bought a diamond necklace at 25,000 francs, and for it she paid 10,000 francs and partly in jewels, stipulating at the same time that, as she might get tired of it, he was to take it back when she desired for any reason. Owing, it is said, to some solid reasons than a wish for a new one, she brought the action. M. Bloch was not disposed to abide by this agreement. It only held good for a short time, he urged, adding that in consequence of the events of 1870-1871 he had lost much by the Jews giving a part payment of the necklace, and that a crisis was taking place in the trade, in consequence of the discovery of diamonds at the Cape, have not granted a great fall in the price of these stones, which he attributed to M. Bloch's early recollection of the original stipulation.

Communication.

Editor Jeweler's Circular and Horological Review.

Having noticed in your paper of late several articles on breaking of main springs, I want to say a few words to you, and to the readers of your paper, hoping that I may contribute a few ideas of my own, which will be considered as valuable before the "distinguished body of watch and clock makers." Enclosed you will find a piece of mainspring which I will use as an example, and as an illustration of the following. The spring is one taken out of an American watch full plate. Newark Watch Works, Edward Breen, New York, N. Y., has been used two or three years. By taking a spring and passing it through the fingers with a slight curve and pressure, you will readily detect an unequal curve throughout its length. Now the first thing to consider is as to the cause of said irregular curve, bad temper; also it is spring too high heat in hardening, as you will see by examining the grain of the steel—the uneven temper allows the spring to come out at a sharper curve when the temper is below the maximum or predominating temper, and as a consequence in its case, wear takes place on the outside of the sharp part, reaching the breaking still earlier, in increasing the curve laterally, and consequent liability to break. The weak portion of the spring bending into a slight curve, finally increased the strain on the adjoining border portion, causing it to give way, and consequently break. You will readily see that provided we could shape springs perfectly uniform in gauge, and temper, and in the way of their breaking, unless from the unavoidable accidents pertaining to the realization of mechanical perfection, rust, abrasion or surface, etc. I think if the subject of breakage is looked into carefully it will be found due to ascertainable causes, and these causes in three-fourths of the cases ascribable to those just stated. That there is an increase of breakage during some portions of the year over another, is very likely, and will probably be explained on very ordinary grounds. To instance, in the spring after a watch has been subjected to the variable temperatures of in and out door exposure, it becomes dislocated on the wearing parts, and the main spring as an example, is exposed to more wear from friction and a greater liability to rust, and a consequent weakening of the liable parts. The rust is probably produced in part by the damp atmosphere being forced in and out of the watch case, from the variable temperature it is exposed to at this season. The rust damp portion of the atmosphere at this season over any other, and the consequent retention of perspiration about the clanking of the wheels will so far further explain breaks at this time. That there is any possible or probable cause for the breakage of one another, or that the wear of a watch prevents such another wear, I do not believe, and I have no doubt that the police I have touched have philosophically enough to cover the majority of cases.

Respectfully yours,

J. L. FISK, Elgin, Ohio.

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The success of the new Gold Cases of the Company is even more encouraging, and notwithstanding the dull times the production of their shop is greater than ever before. This, they believe, is because they are known to make every case PLUMP as stamped, a special certificate of quality accompanying each case on the legal guarantee of the Company. They maintain also the standard of workmanship, and do not follow the frequent plan of requiring their Cases to be made as cheap as possible, without regard to the character of work. The same is true of the decoration of these cases. They direct their workmen and engravers to make and finish these Cases AS WELL AS IT CAN BE DONE, and the result is a GOOD CASE and a HANDSOME CASE. These Cases consequently wear well, and please the purchaser, who exhibits his watch with pride, while they cost but little more than the poorly made and ugly cases, of doubtful quality of gold, with which the market is flooded.

The Sultan's Gems.

From a recent letter from Constantinople to the *Providence Journal*, we quote:

"The accounts which are given of the riches which are hoarded in the palace have the savor of the tales of the Arabian Nights. Beyond doubt a vast deal of wealth, in the form of diamonds and precious stones, is accumulated there. The ostentatious display by the Shah of Persia of his wealth in this direction, on the recent tour of visitation with which he favored Europe, is well known. Among a profusion of jewels on his person, he was accustomed to wear a cap heavily embroidered with diamonds and fastened at the front with a brilliant of enormous size. On the occasion when the Sultan was to receive him as his guest, the grand staircase and the corridor leading to the audience room were, in anticipation of the arrival of the Shah, ordered to be laid with heavy Smyrna rugs studded all over with diamonds, emeralds, and sapphires, so that the royal visitor was obliged to tread under the feet the evidences of greatness which he wore on his head. The Sultan received him as he stepped upon the staircase, in a plain dress, wearing his usual simple set of scarlet cloth, and without personal adornment of any kind. A neat bit of sarcasm for a barbarian. Any visitor at Constantinople can procure a firman from the Sublime Porte to visit the imperial treasure house at the Seraglio, where he will see more wealth in jewel-studded trinkets, diamond-mounted sword-hilts, belts, scabbards, horse furniture and caparisons, cups, vases, articles of Turkish workmanship and single stones of immense value, than would buy the crown jewels in the tower of London twice over. A specimen of the contents of this repository in the form of a golden throne set with precious stones, and which were formerly a present from Persia, is to be sent to our Centennial exhibition. It was one of the contributions of Turkey to the Vienna Exposition. Just now it is the fashion for the women of the harem to make costly presents to the Sultan. These presents are usually something in the direction of the national armament. The mother of the Sultan, who seems to have a head for business, has the credit of inventing this substantial form of feminine blandishment. Some fine pieces of artillery have been thus contributed to wake up the royal favor."

Diamonds.

The *British Trade Journal* states that there has been considerable excitement in the diamond market during the past month and the importations from South Africa, although purchased at advanced rates, have for the most part been cleared off at a small profit. A brisk demand for Constantinople has been mainly instrumental in producing this satisfactory result, but as this demand may cease at any moment, and in all probability will have ceased before this information reaches Kimberley, it is by no means unlikely that a strong reaction will set in. The Turkish demand has chiefly influenced the value of large brilliants of the light-yellow and slightly off-color descriptions, for which better prices have been secured than had been asked for some months previously. But as very large stocks of these have been consigned to Constantinople on speculation, exceeding considerably the amount which may suffice to satisfy the requirements of the market, it may reasonably be inferred that when the unsold portion of this stock will have been returned to London and Paris, it will be pressed upon the market, and exercise a very depressing influence on values. Trade continues dull, and the demand for diamonds slack in all Western Europe, in the United States of America, and throughout the whole continent of South America. Considerable quantities of Cape diamonds, rough and polished, have been returned to Europe from India, where large yellow stones can

be purchased at lower rates than those recently obtainable in London and Paris. It is expected that some good orders for diamond jewelry of fine quality, will come in from Egypt during the autumn, but this is to be only a quarter from which we have any encouragement for the hope that the present rates may be maintained. We should recommend colonial buyers to operate with caution in their purchases of diamonds of the light-yellow and off-color descriptions, while, on the other hand, if supplies continue small, we see no reason to fear any important diminution in values of diamonds of fine quality. Deep yellow stones, always a dangerous article, continue in great disfavor.

Jottings.

To Work Hard Steeling.—If steel is rather hard under the hammer when heated to the proper cherry-red, it may be covered with salt and hammered to about the shape desired. More softness can then be obtained, if required to give a further finish to the shape, by sprinkling it with a mixture of salt, blue vitriol, sal-ammoniac, saltpeter, and alum, made cherry-red again, sprinkled with this mixture, and hammered into shape. This process may be repeated until entirely finished. When ready the steel is hardened in a solution of the same mixture. This method is recommended by prominent workers.

MARBLE STAINING.—Marble can be stained different colors by the following substances: Blue, solution of litmus; green, wax colored with verdigris; yellow, tincture of gamboge or turmeric; red, tincture of alkanet or dragon's blood; crimson, alkanet in turpentine; flesh, wax tinged with turpentine; brown, tincture of logwood; gold, equal parts of verdigris, sal ammoniac, and sulphate of zinc in fine powder.

To MAKE GREEN GOLD.—Melt together nineteen grains pure gold and five grains pure silver. The metal thus prepared has a beautiful green shade.

The following recipes for metals resembling gold are said to produce a metal which will so nearly approximate the genuine as almost to defy detection without a resort to thorough tests: Fuse, together with saltpeter, sal ammoniac, and powdered charcoal, 4 parts platinum, 25 parts pure copper, 1 part pure zinc, 2 parts black tin, and 14 parts pure lead. Another good recipe calls for two parts platinum, 1 part silver, and 3 parts copper.

MAKING BRITTLE GOLD STRONG.—Gold is sometimes so brittle that the jeweler can not well work it; this is probably due to phosphorus, which, being no metal, is of course not detected in the assay. The remedy is to pass chlorine gas through the molten gold, by which treatment most of the gold which had otherwise to be set aside as unfit for certain kinds of work, may be rendered serviceable.

WATER-PROOF GLUE.—Soak in a cool place half a pound of glue for one night in a quart of milk, and boil it the next day; it will resist moisture much better than glue dissolved in water.

A Literary Curiosity.

A great literary curiosity is now for sale at Peking. It consists of a copy of a gigantic work composed of 6169 volumes, entitled "An Imperial Collection of Ancient and Modern Literature." This huge encyclopedia was commenced at the reign of the Emperor Kang-he (1662-1722), and was printed at the Imperial Printing Office, where a complete font of copper type was cast for the purpose. Its contents are arranged under thirty-two divisions, and embrace every subject dealt with within the range of Chinese literature. Unfortunately, the greater part of the type employed in printing the work was, after the publication of the first edition, perished by dishonest officials, and the remaining portion was melted down to be coined into cash. The result is that very few copies are now in existence, and still fewer ever come into the hands of the public. The price asked for the present copy by the Chinese owner is, we believe, about 4,000.

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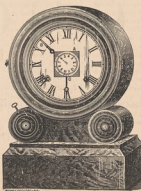
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The Precious Stones of Ceylon.

The station of Ratnapoora, about sixty miles from Colombo, is the centre of the gem-producing district, which extends for about fifty miles along the base of that mountain range. Gems are occasionally found in other parts of the hills, but seldom of sufficient value to repay a formal search; but in this district alone it is a regular occupation of the people. Here the digging is carried on in the beds of streams, and in the alluvial plains lying in the valleys upon their banks.

The gems found in this locality are the sapphire, the ruby and topaz. The spinel ruby is also found, but more rarely; also the cat's-eye amethyst and beryl.

Gem-digging is principally carried on by the native Cingalese. In the intervals of their agricultural operations, parties of villagers, from three to six, join in partnership, contributing their labor and the implements required. They camp out for weeks, and often months, for the purpose. The work is carried on either in their own land, or on the waste or crown land, and, if successful, the produce is sold and the proceeds divided among them.

As to the locality, picture to yourself a hawk, varying from ten to fifty feet wide, bordered by luxuriant vegetation, among which planned groups of bamboo are the most conspicuous, winding through a narrow level strip of grass or crown land, abating on abrupt hills clothed with evergreen woods and clumps of palm trees, above which the higher hills stand draped in dark primal forest. In such a secluded spot may be seen half a dozen natives in scant clothing, and with coarse straw hats, carrying three or four long hoes, and as many sifting-baskets, and a few dried tannin palm leaves, each eight or ten feet long, to form a tent until they can build a hut from branches or materials on the spot. The first thing they do is to probe the sandy bed of the stream with a twelve foot rod; and, from long practice, the natives, accustomed to the work, can form a good guess of the nature of the subsoil, and the probability of finding the gem deposit of which they are in search.

When the place is decided on, they form a loose dam of sticks and stones above the spot to turn off the force of the stream, leaving a sufficient current to carry away the sand and earth excavated; within this dam a pit is dug, six or eight yards square, according to the nature of the soil, from which the sand is dragged into the tail of the stream to be carried away by the current. The hoes used are a little larger and more hollowed than those used for scraping mud from our roads, but the handles are fifteen or twenty feet long, for the layer of gravel in which the gems are found is often that depth below the bed of the stream. The men work up to their waists in water, and in favorable weather it takes four or five days or a week to dig a pit twelve or eighteen feet deep, if all goes favorably; but being done in shallow water, it has a constant tendency to fill up by the action of the stream.

The excavators draw up their hoes carefully, pour the gravel they contain into the baskets held by their companions standing in the water. The baskets are about two feet across, woven closely and evenly of fine bamboo splints, with a strong round border.

The basket men throw out the large stones, break up the mud and gravel, and sift it in the water, which carries off all the refuse. The coarse gravel is then washed out of the baskets by a circular motion under water, while the baskets are being constantly replenished. The gems are so much heavier than the other stones that they always make their way to the conical point at the bottom of the basket, and the operator can wash out all the gravel to a last haul without fear of their escaping. He then examines this small quantity, which consists of garnet sand and seen gems, and having secured any stones of value for cutting, throws away all the rest.

The digging for gems in dry ground is more laborious, lacking the aid of water of the stream to carry away the sand. The localities are the same; but, instead of digging in the bed of the stream, large

pits are dug in the adjoining meadow land until the gem stratum is reached; the gravel is then carried in baskets to the bank of the stream, and sifted in the water as before. This, however, is a more certain mode of obtaining all the precious stones which are in the pit, many of which escape notice by the slower method, where the work is carried on under water, and, as it were, in the dark, and many good stones escape the hoe; on this account the diggings under water often prove very remunerative.

The Moor traders are very expert in the manufacture of false gems. On the occasion of the building of a church at Kandy, a Moorman bought up all the broken colored glass from the painted windows; and on being asked for what purpose, confessed that it was "to make precious stone for English steamer passenger at Galle." They also imitate the rough stones, and occasionally even deceive the more experienced. They are sometimes themselves taken in. On one occasion a Moorman endeavored to induce one of a party of native diggers to sell him a sapphire surreptitiously, to which the Cingalese agreed; and the next day the Moorman came, proving about, and watching the digging and sifting, till a beautiful rounded blue stone appeared shining among the wet gems; a hungry crowd with a few signs and the money and stone exchanged with the utmost secrecy. The Moorman disappeared, to gloat over his knavery and his gains; but the sapphire was not his beautiful gem was a piece of rough glass, which the Cingalese had provided himself with and quietly slipped into his basket.

The Ceylon ruby is seldom seen from a tint of blue, and it is a remarkable fact that while the blue color can be expelled from such stones by heat, the red color is indestructible, and the native jewellers avail themselves of this peculiarity to improve the color of their rubies.

It is very common to find stones one half blue and the other half colorless, and some have merely a crust of blue on one or more sides. The native lapidaries take advantage of this in cutting, and by leaving the colored part on the under surface, form a foil which gives a fine blue to an otherwise valueless stone.

The opalescence above mentioned is found in rubies and sapphires as well as in topaz; it is worse than any flaw in depreciating their value; a crack or cavity can be cut out, but opalescence which is most difficult to detect in an uncut stone, reveals itself in the cutting, and often runs in a pencil through the whole breadth or length of a gem, destroying its clearness and color, and rendering it comparatively worthless. When such stones are cut hemispherical on *cabochon* at a certain angle to the axis, they form the star stone, showing a star of six rays in a strong light. This is very pretty as a fancy stone, but has no value as a gem.

We will now take a look at the proceedings of the native lapidary. His means and appliances are few, consisting of a pair of laps attached to spindles by a connecting rod, and a small wooden block. One lap is of lead, on which pounded corundum or adamantine spar is used for reducing the stones and shaping them in the rough. The other is of copper, for polishing the facets. Instead of diamond powder they use for this purpose a fine silk extracted from the calcined husks of rice. The rice are lodged in, and worked by a bow. The native lapidaries use no gem pegs or mechanical instruments for regulating the angles, but work entirely by the eye, and endeavor to avoid the recession they attain, although it is difficult for them to bring the gems to a perfect level by hand, and consequently all native-cut stones are heavily by a slight beveling of the facets. In the towns they have now adopted the European horizontal laps and fittings. The stone to be cut is fixed on the end of a stick with the same luting of resin and sand, and applied by the left hand to the vertical plate, while the right hand works the bow.

In cutting a stone, the natives sacrifice everything to size. Gems to show their most beautiful light and color, should be

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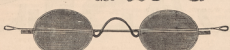
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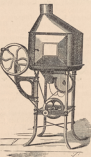
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Machinists, &c.

Turning Lathes, Drills and
Clock and Meter Dies, also Watch Makers,
Plates, Rolling Mills, Draw
Plates, Piercing Saws, Horse
Shoe Magnets, Nuts, Ingots,
Chasing Tools, Engravers'
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Brass, Iron, Brass, Pewter,
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ver, Brass, &c.

AGENTS FOR THE KEYSTONE FORCE.

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Novelty Jewelers' Traps or Assayers Furnace.

No. 62 Chatham Street, New York.**Buyers' Directory.**A Guide to the prominent Whole-
sale Houses in the Watch, Clock,
Jewelry and kindred branches of
Trade in New York.**Clock Companies.****American Clock Co.**—Manufacturers of Clocks
of all kinds. Salesrooms, No. 261 Broadway,
New York.**Ansonia Brass & Copper Co.**—19 & 21 Cliff
street, New York.**Cooke, Benjamin J.**—Wholesale Dealer in all
kinds of Clocks and Regulators, No. 127
North 3d Street, Philadelphia, Pa.**Kroemer, P.**—Clocks and Regulators of every
description, No. 8 Courtland Street, N. Y.**United States Clock Co.**—Henry Terfune & Son,
2 Courtland street, N. Y., Manufacturers of
Fine Regulators and American Clocks.**Waltham Clock Co.**—M. Bailey, Treasurer,
Masters and Jobbers, No. 4 Courtland Street,
N. Y., No. 140 Clark Street, Arcade Building,
Chicago.**Wood, James**—Manufacturer, Importer and
Dealer of Fine Regulators and Clocks of every
description 4 Courtland street, N. Y.**Corals and Coral Jewelry.****Erlich Bros.**—Established 1859—Importers of
Coral Jewelry, 19 John St. N. Y. Mann
factory, 39 St. Catherine's Church, Naples, Italy.
Lawson & Graubner—Manufacturers Fine Gold &
Coral Jewelry. Fine Jewelry altered, re-
fined and repaired, No. 63 Nassau St., N. Y.**Cameo Cutters, etc.****Bonett, L.**—(Successor to Bernard & Bonett)
Carve in Lithoness, No. 299 Broadway
New York.**Chronometers.****Bliss, John & Co.**—Standard Marine Chronom-
eters, Transits for Watchmakers' Use, No. 110
Wall street, N. Y.**Charms & Gold Watch Keys.****Rapp & Held.**—Manufacturing Jewelers, Charms
and Gold Watch Keys, etc. French and Eng-
lish Batches, a specialty. 15 John st., N. Y.**Diamonds.****Bernhard, A. & Co.**—Manufacturing Jewelers &
Importers of Diamonds, Fine Jewelry, etc.
460 Broadway, Glass building, N. Y.**Blasinger, E.**—Importers of Diamonds, No. 183
Broadway, N. Y.**Price, Henry**—Importer of Diamonds, No. 19
Maiden Lane, New York.**Morch, Jacob**—Importer of Diamonds, Pearls,
French & Italian Stone Cameos, Amethysts,
Onyxes, and Precious Stones. Diamonds in
pairs a specialty. No. 23 Maiden Lane, N. Y.**Neresheim, E. Aug.**—Importer of Fine Dia-
monds, No. 5 Maiden Lane, New York.**Diamonds and Diamond Jewelry.****Borseman, Louis**—Manufacture of Diamond
Jewelry. Russia a specialty: superior fash-
ions and original designs. Send for Price List of
Staple Articles, 109 & 171 Broadway.**Smith & Hedges**—Importers of Diamonds Ex-
clusively, and Manufacturers of Fine Diamond
Jewelry, 1 Maiden Lane, cor. Broadway, N. Y.**Taylor, Olmsted & Taylor**, Importers Diamonds
and Diamond Jewelry, 5 Bond street, N. Y.**Diamond Settings, etc.****Friedl, R.**—Manufacturer of Fine Jewelry, and
Diamond Setting, 25 John street, N. Y.**Enamellers, etc.****Orr, Jas. Co.**—Enameler on Fine Jewelry. Flow-
ers, Birds, &c., Enamelled in colors. Hand
Bracelets (a specialty), 77 Nassau Street, N. Y.**Dials, &c.****Casner Brothers**—Manufacturers of Enamelled
Clock and Meter Dials, also Watch Makers,
No. 42 John Street, New York.**Gold, John T.**—(Successor to late T. Gold),
Enamel Watch Dial Maker, No. 81 Nassau
Street, New York.**Engravers and Die Sinks.****Arley, William**—Designer & Engraver of Watch
Cases, Jewellery, etc. Monograms, Crests,
Lettering and Ornamental Engraving, No.
8 Nassau Street, N. Y.**Dobson & Wood**—Engravers & Enamellers of Pre-
cious Stones, 169 & 171 Broadway, Room 23,
New York.**Fackner, Edward**—Carver, Engraver and Chaser
on Jewelry, Monograms, Lettering, &c.
No. 19 John street, N. Y.**Hennig, Albert J.**—Die Sinker & Engraver, 217
Centre street, N. Y. Dies for Jewelers and
Silversmiths, Enamelling Plates, Seals, &c.**Knapf, Charles**—Engraver, Die Sinker and De-
signer for Jewelry, &c. 14 and 18, Shanks
and Hooker Rings, &c. 41 Maiden L., N. Y.**Mahl, Robert H.**—Engraver, and Die Sinker,
Steel Stems for Watch Case Makers and Sil-
ver Smiths a specialty. 42 Nassau St., N. Y.**Park, William**—Stone Seal & Cameo Engraver,
and Die Sinker. Masonic Devices and En-
graving for Incorporation, 262 Broadway, N. Y.
Room 145.**Schmidt, J. Danl.**—Stone Seal Engraver, Arms,
Crests, Initials and Monograms engraver, cor.
Stone Seals, &c., No. 71 Nassau Street, N. Y.**Electro Platers.****Jeandrou, P. & Son**—Gold and Silver Electro
Platers, Fire Gildings, Coloring Britannia and
Gold Jewelry specialty, 71 Nassau St., N. Y.**Jeannot, P. A.**—Gold and Silver Electro-Plat-
ing and Britannia Gilding and Repairing
Watch Cases a specialty, 63 Nassau street.**Normandeau, P. A.**—Electro Gold and Silver Nickel
Plating. Coloring Gold and Silver work a
specialty, No. 102 Nassau Street, N. Y. Sole
Agent of New York Nickel Plating Company.
Licensed by United Nickel Company.**Nickel Plating.****Scherrer's** Nickel Plate Works. Plating on all
metals by an improved solution. 62 Dry St.**Nickel Watch Finishers.****Boynett, E. & Co.**—Nickel Watch Finishers and
Nickelizers. Watch Engraving a specialty.
No. 5 Maiden Lane, N. Y.**Fancy Goods, Clocks, Bronzes, etc.****Hays, Alex. M. & Co.**—Importers of London,
Paris and Vienna Fancy Goods, Clocks,
Bronzes, Musical Boxes, Diamonds, Watches,
Jewelry, etc., 25 Maiden Lane, N. Y.**Hirschfeld, C. F.**—Importers and Dealer in
French, English and German Fancy Goods
etc., 25, 31 & 33 Park Place, N. Y.**Magnin, Y. J. Quinlan & Co.**—Importers of Clocks
Bronzes, Musical Boxes & Rich Fancy Goods
etc., 63 Broadway.**Le Boulanger & Fride**—Importers of Fancy
Goods, Clocks, Bronzes, &c., No. 10 Maiden
Lane, N. Y.**Gallery Settings.****Waller, Edward**—Gallery Settings & Incrusted
Stones, 12 and 14 John street, N. Y.**Gold Chains, etc.****Beck, J. & Son**—Manufacturers of Fine Gold
Chains and Chain Bracelets, 10 Liberty place,
cor. Maiden Lane, N. Y.**Pollak & Dreyfus**—Manufacturers of Gold
Chains with Patent Safety Swivel Attach-
ment, No. 1 Maiden Lane, N. Y.**Kasdan, Ben**—Manufacturers of Gold Chains,
and Chain Bracelets, 30 John street, Factory,
115 5th street, N. Y.**Lobnitz, Albert**—Manufacturer of Fine Gold
Chains. All goods warranted. No. 35 Maiden
Lane, New York.**Smilie, Dorrance & Edge**—Manufacturers of the
Celebrated Woven Fabric Gold Chains
and Chain Bracelets, 5 Maiden Lane.**Gold Pens, Etc.****Alkin, Lambert & Co.**—Manufacturers of Choice
Gold Pens, Cases, Holders, Toothpicks, etc.,
12 Maiden Lane, N. Y.**Todd, Edward & Co.**—Manufacturers of Gold
Pens, Pencil Cases, Tooth Picks, &c., 652
Broadway, N. Y. Factory, Brooklyn.**Gold Rings.****Bowden, Joseph B.**—Manufacturing Jeweler,
Solid Gold Rings a specialty, No. 1 Maiden
Lane, New York.**Ely, W. H.**—Manufacturer of Solid Gold Rings
of every description. No. 58 Nassau Street,
New York.**Hair Jewelry.****Bernhard, A. & Co.**—Manufacturers of Fine
Hair Jewelry and Trusses Work. The latest
styles. 160 Broadway, Room 3, New York**Frankie, H. C.**—Late Charles Frank & Co.)
Make Hair Jewelry & Jeweled Work, Importer
of Alloying Copper. Sample books always on
hand, 165 & 167 Broadway.**Jewelry Cases, Fancy Boxes, etc.****Brass, Chas. L.**—Manufacturer of Jewelry Boxes,
Trays for Show Cases, &c., 65 Chatham
Street, N. Y.**Dahman, W.**—Manufacturer of Cases for Jewelry
and Silverware, No. 85 Nassau Street, N. Y.**Jackson, Samuel C.**—Manufacturer of the re-
cent styles of Boxes and Trays for Silverware
& Jewelry, No. 189 Broadway, N. Y.**Sturm, L.**—Manufacturer and Importer of Cases
for Jewelry, Watches, Silverware, etc.,
No. 101 Nassau Street, N. Y.**Welch & Miller**—Manufacturers of Morocco
Velvet and Satin Jewelry Cases, Trays, etc.
A full stock always on hand. Room 13,
No. 160 Broadway, N. Y.**Wiggers & Froelich**—Manufacturers of Fine
Morocco Cases for Jewelry, Watches, Jew-
elry Trays and Porcelain Ring Trays, &c.
No. 90 Nassau Street, N. Y.

Jewelry-Fine.

Albin, Lambert & Co.—Manufacturers. General stock of Reliable Jewelry, No. 13 Maiden Lane, N. Y.

Bailey, Seaton & Peterson.—Manufacturers of Fine Jewelry. No. 1 Bond street, N. Y.

Ball & Bernard.—Manufacturers of the Self-Adjusting Band Rings of Gold (Branco's a Specialty). No. 4 John Street, N. Y.

Barthman & Straus.—Manufacturers of Fine Jewelry. Seal and Stone Rings a specialty. Orders promptly filled. No. 41 Maiden Lane, N. Y.

Beaton, Andrews & Co.—Manufacturers of Fine Jewelry. No. 30 Maiden Lane, N. Y. Roman and Etruscan jewelry a specialty.

Block & Parker.—Manufacturers of Fine Jewelry, Lockets and Rings. Special attention given to ordered work, 25 Nassau street, N. Y.

Blossing, E.R.—Importer of Fine Jewelry, Lockets, Crosse, Neck Chains, etc., No. 192 Broadway, New York.

Brown, Cook & Co.—Manufacturers of Fine Gold, Enamelled and Plain Lockets, No. 191 Broadway, N. Y.

Brinard, Street & Co.—Manufacturers of Fine Jewelry and Brinard's Patent Lockets, No. 9 Maiden Lane, New York.

Carter, Hawkins & Sloan.—Manufacturing Jewelry. No. 52 Broadway, N. Y.

Chatterell & Spence.—Manufacturing Jewelry, Lockets a specialty. Office, old No. 9 Maiden Lane, N. Y.

Diamonds.—Manufacturers and Importers of the Jewelry, Crown and Onyx Lockets, Seal Buttons and Sets a specialty. Old No. 10 Maiden Lane, N. Y.

Fitch & Chatterell.—Successors to Merrill, Fitch & Allen—Manufacturers of Fine Gold Jewelry, Seal Bands and Chain Bracelets, No. 19 John street, N. Y.

French, P.—Manufacturer of 18k and Fine Jewelry. Enamelled Work, Jobbing attended to with dispatch. No. 14 John street, New York.

Geddes, John M.—Manufacturing Jewelry. Seal Rings and Fine Lockets a specialty. No. 25 Maiden Lane, New York.

Griffin, H.—Manufacturer of Fine Jewelry, Studs and Buttons a specialty, jobbing attended to, N. Y. N. Y. Factory, Brooklyn, N. Y.

Hart, J. C.—Manufacturer of Fine Jewelry, Studs and Buttons a specialty, jobbing attended to, N. Y. N. Y. Factory, Brooklyn, N. Y.

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Jewelry's Tools and Findings.

Diamond & Co.—Manufacturers of Jewelry Findings, Paper Boxes, Cards, Tags, Buttons, Tissue Papers, etc., 302 Broadway, N. Y.

Fine Jewelry.—Manufacturers of Fine Jewelry, German and Sheffield Tools, Fine Steel Wire for Watchmakers, Jewelers, etc., 82 Chatham street, N. Y.

Lapidaries.

Fox, M. C.—Practical Lapidaries and Importers of Precious Stones, Carls, Tags, Buttons, Agate Mosaic, No. 1 Maiden Lane, N. Y.

Frederick & Wason.—Manufacturers of Precious Stones, Rose Diamonds and Rubies, 33 Nassau street, N. Y.

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Walking Canes.

Pradley, J. P.—Manufacturers of Fine Gold and Silver Headed Walking Canes. 18 John Street, New York.

Locklin, P. P.—Manufacturers of Gold and Silver Headed Walking Canes, Jewelry, etc., No. 142 Fulton street, N. Y.

Rest Penner Smith & Co.—Manufacturers and Importers of Walking Canes, 343 Broadway, New York.

Waterman, W. H.—Manufacturer of Fine Gold and Silver Headed Walking Canes, No. 15 Maiden Lane, N. Y. A specialty made of Precious Metals.

American Watch Companies.

A. M. Morrow, Agent.—111 Chestnut Street, New York.

The Philadelphia Watch Co.—No. 618 Chestnut Street, Philadelphia, Pa.

The International Watch Company.—Factory, Schaffhausen—Agents, Schwaib, Ross, & Co., 123 Broadway, New York.

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Jennings, Wm. C.—Manufacturers of Watch Cases, No. 30 John Street, New York.

Laurent, J.—Watch Case Manufacturer, Gold and Silver Cases, 100 Broadway, New York.

The Dasher Watch Case Manufacturing Co.—114 W. Fourth street, N. Y. Braving and adding 14 John St., New York.

Viro & Co.—Manufacturers of Gold and Silver Watch Cases, 189 Broadway, N. Y. Top floor.

Watch and Chronometer Repairer.

Curt, B.—Practical Watchmaker and Repairer, No. 100 Broadway, N. Y. Braving and adding 14 John St., New York.

Watch Case Repairers.

Chendlin & Cordier.—Watch Case Repairers, 77 Nassau street, rear building, room 20, N. Y.

Tarbox, Hiram.—Watch Case Repairing, Springing, Polishing and Engine Turning, 79 Nassau street, room 23, N. Y.

Watch Keys.

Clark, A. N.—Manufacturers of Light Metal Goggles, Watch Keys, Watch Case Springs, Combination Watch Keys, etc., Palmyra, Ct.

Watch and Clock Repairers.

Egler, E.—Repairs of all watches and clocks of every description. Special attention paid to French Clocks, 30 Maiden Lane, N. Y.

Watch Glasses, Shades, Etc.

Berger, Albert.—Co.—Importer of Watch Glasses, Spectacles, Opera Glasses, Telescopes, etc., No. 47 Maiden Lane, N. Y.

Brown, Edwin.—Dealer in all kinds of Watch Glasses, Spectacles, Opera Glasses, etc., No. 33 Nassau Street, N. Y.

Hill, Robert S.—Manufacturer of Watch Glasses, Spectacles, Opera Glasses, etc., 75 & 77 Nassau street, N. Y.

Walker, A. C.—Manufacturers and Importers of Watch Glasses, Spectacles, Clocks, Musical Boxes, etc., No. 40 Maiden Lane, N. Y.

Watchman's Time Detectors.

Inhaber & Co.—Manufacturers of Watchman's Improved Time Detectors, No. 212 Broadway, N. Y. Post Office Box 4708.

Providence Directory.

A Guide to the prominent Manufacturing Jewelers of Providence who manufacture for the Jobbing Trade.

Bracelets.

American Bracelet Co.—Manufacturers of Thomson's Patent Telescope Bracelets, 26 Potter street, Providence, R. I.

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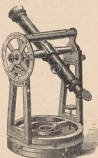
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Translated for the Jeweler's Circular and Horological Review by Joseph Rogers.

THE ANNUAL BALANCE.

HISTORICAL NOTICE.

The first form of balance ever used in watches was a simple straight bar having a weight attached at each end. In some watches with balances of this description, the angular motion of the balance was regulated by means of two adjusting screws or nuts. These screws confined the vibrations, and by lengthening or shortening their extent, the watch was regulated to run faster or slower. As a general rule, however, in all the old watches we have seen, we have found a small circular or annular balance doing its work in precisely the same manner as we can imagine it would do in a verge watch having no hairspring.

As a balance is contrated by heat and expanded by heat, its oscillations require to be quicker in a low temperature and slower in a high one. To avoid these inconveniences and also those arising from the action of heat and cold on the hairspring, Harrison contrived the compensating curb, which, in changes of temperature altered the acting length of the hairspring.

P. Le Roy declared that this method utterly destroyed the isochronous qualities of the hairspring, and if this method had been adopted, watchmakers would have noticed that gentlemen, who certainly was a genius, produced in a formula, the principle of the compensation balance used at the present day. After the most careful inspection of its texts and figures, the following are three of his conclusions which we notice:

2. Two opposite acting masses attached to a common annular balance were removed from their places by the changes of temperature, under the action of the arc of a bi-metallic circle, adjusted by one leg to the rim of the balance.

3d. The balance with a bi-metallic curb cut just as those of our day but having four arms and masses.

4d. Finally a balance having a bar made of one metal but not cut, carrying two small thermometers arranged in opposite directions and producing compensation by the contraction or expansion of mercury.

This balance had also two regulating screws such as are used in our modern chronometers.

P. Le Roy did not go any farther, after having constructed his two chronometers. The last disposition above mentioned afforded to him a rectilinear compensating motion. The other two dispositions, if we take into account the size of the balance proposed, offered serious difficulties to their execution.

The chronometer of P. Le Roy was presented to the King, and to the Academy of Sciences in 1766, and in the same year his descriptive Memoirs were forwarded to the Academy, and was published in 1770.

Two years later, J. Arnold constructed upon the principles of P. Le Roy, several chronometers with compensation balances consisting of a bi-metallic rim cut and provided with compensation weights and regulating screws.

The first compensation balances were very difficult to construct, as they were formed by fastening two metallic plates to each other by means of several rivets. Some of these may be seen in the chronometers of L. Berthoud, and A. Bréguet, and they are undoubtedly master-pieces of execution. At the present time we cast the one metal on to the other.

THEORETICAL NOTIONS AND DEFINITIONS.

Momentum of Inertia and Regulating Power of the Balance.

The momentum of inertia of a balance is the product of the multiplication of all the molecules which constitute the mass by the square of the distance of any of these molecules from the axis.

It is the same as if we should consider every molecule in circular motion acting by itself and independent to the end of its radius; or, were all these molecules placed together, the greatest effort on the point

of a total radius where the action of the molecules situated on the outside is equal to the action of the molecules situated on the inside. That is, the point in the mass where it works with the same power as if it were entirely concentrated on this point.

The turning circumference of a balance goes through this point, and the right line starting from it to the centre of rotation is the *turning radius*, giving the virtual size of the balance. The turning diameter is to an annular balance what the simple pendulum is to the material pendulum; it is that the regulating diameter.

The momentum of inertia shows the resistance of the balance against the causes which could alter its movement, and for one mass this value is increased or lessened according to the distance of this mass from the centre of motion.

The regulating power of a balance is not measured at its external size and total weight. Its principal elements are:

1st. In the highest cipher of its momentum of inertia.

2d. In the form that makes it less sensible to the influences, resistance of pressure, etc., etc.

For one mass of weight, the momentum of inertia is proportional to the square of the distance, and these radii are in inverse ratio to the number of oscillations during the same time. Therefore the effect in advancing or retarding, produced by the approximation of the mass or by its distance from the centre of motion, changes like the square of the distances of the centre of mass to the centre of the axis—that is in inverse proportion to the amount of oscillations.

For wheels of the same size radius the momentum of inertia is proportional to the masses or weights.

The square of the number of oscillations are to each other in inverse proportion to the momentum of inertia. Therefore for one radius the masses will be in inverse proportion of the square of the number of oscillations.

The above shows that we cannot obtain any positive data about the regulating power of balances by comparing their external size. It is in the reason why all discussions on the large and small balances used in watches have never reached a satisfactory conclusion.

Now—this is the point so often used in the estimates must be clearly understood to avoid confusion.

1st. *Angular speed* means the angle of moving in the unit of time, of a lever turning on an axis. It has nothing to do with the length of the lever. The average relation of the angular speed of a balance with cylinder escapement and of the balance of a chronometer in the same unit of time (for instance 4 of a second for 18,000 vibrations per hour) is about 1:270°:360°.

2d. The speed properly so-called, is the speed travelled in a unit of time, by the considered point (takes here on the circumference of turning). We have the average relation of speed for one angle of movement by multiplying very rapidly the number of oscillations realized in the unit of time.

To determine the radius of turning and the momentum of inertia of a balance.

The size of a balance being equal to the double of the radius of turning, its regulating power depending on the momentum of inertia, and these momentums of inertia being to each other as the squares of the radii of turning; all that once established we come to the conclusion that it is necessary by determining the radius of turning of a balance. The exact estimate is very difficult to determine, but we can by the aid of the methods we shall give afterwards, obtain the approximation we require for most all the cases.

In the balance of our modern chronometers, being overloaded with great masses on the circumference, the centre of turning differs very little from the centre of the watch, and if we desire to have approximately the momentum of inertia we must take as the radius of turning the distance from the middle of the rim to the centre of the axis. In dealing with primary masses it is necessary to start the external part of the rim. The momentum

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of inertia is obtained through the following formula:

$$A = P \times r^2$$

A, is the momentum of inertia; P, the weight of the balance; r, the radius of turning; g, the gravity to be substituted by the number 9.80896. That is, we multiply the radius by itself; then this product by the weight of the balance; and the general product thus obtained is divided by 9.80896; the result of this division is the momentum of inertia of the balance.

The safest way of doing in all cases is this: We take a balance exactly of the same size and weight of that one we are going to use. We break and separate the small bars of this trial balance. Then we weigh carefully the rim, and afterward the small bars together, and the radius of turning is determined by this formula:

$$K = \frac{P \times R^2 + P \times R^2 + P \times R^2}{P \times R^2 + P \times R^2 + P \times R^2}$$

p + p' being = P - K, the turning radius - P, the total weight less the small disc of the centre - p, the weight of the rim - p', the weight of the small bars - R, the outside radius of the rim - R', its inside radius.

Practical Applications.
If a balance makes a certain number of oscillations in a given time, how much shall we have to increase or lessen its weight if we want to retard or advance its motion in the same time and for a known quantity?

First Example.—If we have a balance retarding 5 minutes per hour and weighing 3 grammes (every gramme is equivalent to 15.433 grains troy or avoirdupois) we shall have this proportion: the square of the marked running time (55 minutes per hour) is to the square of the running time to obtain (60 minutes) as the unknown weight x is to the known weight (3 grammes) or:
 $55^2 : 60^2 :: x : 3$
which is the same as

$3025 : 3600 :: x : 3$
and the product of the extremes being divided according to the method we know
 $3025 \times 3 = 9075 : 3600$
 $18750 : 2.32$
7500
300

x will be = 2 grammes, 52. And we shall have to lessen of 48 centigrammes the weight of the balance.

Second Example.—Let us have another balance of the same weight, three grammes, advancing 5 minutes, that is marking 65 minutes per hour.
The proportion will be $65^2 : 60^2 :: x : 3$ wherefrom we have $x = 3$ grammes, 52, we shall increase therefore 52 centigrammes its weight.

A balance (B) making a known number of vibrations, how much shall we increase or lessen its diameter, the weight remaining all the time the same, so as to have with a new balance another determined amount of vibrations?

This problem is solved by the following proportion:
Radius B : radius x :: number of vibrations of B : vibrations of x

Example.—B being equal to 10 millimetres and making 15000 vibrations, what has to be the radius of C to be able to make 15500 in the same time?

$10 : x :: 15500 : 15000$
or $10 \times 15000 = 150000$
 $150000 : 15500$
100000
120000
9.67

that is x = 9.67.
The new balance C must have 9 millimetres, 67 for its radius if we want it to make 1550 vibrations more than the other in the same time.

In the above cases we had only to deal with the change of the number of vibrations by the changing of the weight and diameter, but we had nothing to do with the regulating power. This is another question to be solved by the comparison of the momentum of inertia.

We must not close this chapter without warning our readers that it is utterly impossible to make any correct estimate about balances, if we do not start from its diameter of turning.

Celebrated Goldsmiths of Olden Times.

The following account of the celebrated goldsmiths is from a plate of their arms at the Secretary's Office of the Goldsmiths' Company, London, and may be interesting to our readers here:

- 1100. Leofstane, Goldsmith, Provost of London.
- 1189. Henry Fitz Alyn, Fitz Leofstane, Goldsmith, and Mayor of London.
- 1200. Ade, the King's Goldsmith.
- 1222. Igor, Goldsmith, Master of the Mint.
- 1238. William, the King's Goldsmith, Master of the Mint.
- 1275 to 1281. Gregory de Rokeshy, eight times Mayor, Chief Assay Master of all the King's Mints in England.
- 1280. William Farrington, Goldsmith, Sheriff of London.
- 1308, 1323. Sir Nicholas Farrindon, Goldsmith, Mayor four times.
- 1355. William de Gloucester, Goldsmith, Keeper of the Dies.
- 1376. Jecve the Goldsmith, Keeper of the Dies.
- 1410. Sir Dru Fitzburgh, twice Lord Mayor, died 1415, Foster.
- 1415. William Fitzburgh, Goldsmith, Comptroller of the Mint.
- 1445. Humphrey Hayford, Goldsmith, Comptroller of the Mint.
- 1485. Bartholomew Read, Goldsmith, Master of the Mint.
- 1527. Martin Bowes, Goldsmith, Master of the Mint.
- 1543. Sir Martin Bowes, five times Mayor, Goldsmith, Master of the Mint.
- 1545. Lawrence Warren, Goldsmith, Mint Assay Master.
- 1702-1722. Sir Francis Child, Goldsmith, Temple Bar, Mayor.
- 1712-1740. Paul de Lamerie, Crown Goldsmith.

ENGRAVERS TO THE MINT.

- 1100. Otto the elder and younger, Goldsmiths.
- 1150. W. Fitz Otto, Goldsmith.
- 1214. Richard Abel, do
- 1265. Thomas Fitz, do
- 1280. Hugh Fitz Otto, do
- 1290. Thomas Fitz Otto, do
- 1294. William Fitz Otto, do
- 1319. J. Edmund do
- 1422. Gilbert Van Brandeburg, Goldsmith
- 1432. John Orewell, do
- 1445. William Woleward, do
- 1461. German Lynch, graver of the punches.
- 1483. John Shaas, do
- 1487. Nicholas Flynte, do
- 1509. John Sharpe, do
- 1520. Demaire, do
- 1553. Dorie Anthony, do
- 1555. Vincentius, do
- 1560-78. Dorie Anthony, do
- 1579. Manestrelle, do
- 1612. John Dieker, do
- 1611. Charles Anthony, do
- 1628-36. Nicholas Brist, do
- 1633. Edward Greene, do
- 1646-49-58-72-74. Thomas Simon, do
- 1648. Thomas Rawlin, do
- 1662. James Rother, do
- 1672. Norbert Rother, do
- 1672. Philip Rother, do
- 1672. Joseph Rother, do
- 1674-88. John Rother, do
- 1672. Peter Blondeau, Engineer, his patent expired in 1688.
- 1685. Henry Harris, do
- 1706-27. John Croker, do
- 1706-26. Samuel Ball, do
- 1706. Gabriel Clerk, do
- 1727. John Rolles, do
- 1727. Beresford, do
- 1729-40. J. Sigismund Tanner, do
- 1741, 1749. James Anthony Dasser, do
- 1744, Richard Yeat, do
- 1741, 1742, 1749. J. Ralph Oaks, do
- 1742. John Tanner, do
- 1764. Lawrence Natter, do
- 1771. Thomas Pingo, do
- 1779. Lewis Pingo, do
- 1787. John Pingo, do
- 1797. Nathaniel Marchant, do

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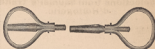
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On Making and Applying Balance-Springs

From the *British Watchmaker's Journal*

Although your *Journal* has continued a good deal on this head lately, the growing importance of the subject will warrant my giving a few practical suggestions on the making and applying balance-springs to watches. Thirty years ago every finisher made and applied a spring to the watch he finished (except a very few of the best watches, which were sprung with what were termed hand-made springs, turned up, as described by Mr. Palmer in his essay, or the ordinary tool-spring, hardened between two pieces of brass secured together—a very clumsy and almost impossible way of hardening a spring and keeping it in shape). Now, very few finishers know anything about either making or applying them. About this time Mr. Lutz, of Geneva, discovered a method of hardening springs (other than the old process of fire and water) and imparting a very beautiful appearance to them. He exhibited a case of these springs in the Exhibition of 1851, which came into my possession afterwards; and very beautiful things they were, in all forms and colors. I believe the Commissary gave him some assistance to enable him to perfect his invention; but I do not think the system has improved since then, although the secret is still a family one. Great quantities of these springs, and others made in imitation of them, have been brought to this country, superseding the old tool-spring of the finishers, as they deserved to do; but they are altogether unworthy of a good English watch (although too frequently applied to watches receiving that appellation, as the process of hardening, however it is, destroys the steel, and if at all hard makes it brittle and rotten).

I will now describe the process of making good springs, beginning with the ordinary flat spring. Take a piece of brass or German silver, about the eighth of an inch thick, drill a hole in the centre and fit it out in the mandrel to about $\frac{1}{8}$ of an inch in diameter, in the form of a small watch-barrel. This is called a spring-box. Fit a lid to it, also with a hole in the centre; turn down a piece of brass wire with



To polish outer side of Case, and practice. If the spring be placed on a piece of flat cork and a finely-cut tool be inserted through the centre, and pressed firmly on the cork, the spring will take the form of a cone, and by moving the piece of cork stuff on it backwards and forwards, and also in a lateral direction, the inside of the spring will be polished in a few minutes; care being necessary not to bend the spring, as if bent in the polishing it is useless. The flat ends of the spring are polished on writing paper rubbed over with red stuff, by pressing the end of the middle finger on the spring, and moving it gently in a circle. Some use cork or path instead of the finger. Wash the spring in benzoline, and it is ready to use. Care and experience are necessary to blue a spring well, but the practice will repay the trouble and time.

The tool for making the Breguet-spring must be somewhat different, as only two of these springs are made at a time; therefore, all that is wanted is a slit cut across the pivot or small part of the winder. The pivot should project a quarter of an inch through the box, and two, instead of three, holes made on the side of the box. The wire, to give the requisite number of

turns in the flat-spring in a given size, must be flat and broad; but when two only are made at a time, the wire should be very little flattened, else the coils of the spring will be too close together. The reasons for a difference in the lengths of fit, and of Breguet-springs, are given. The spring can now be applied to the balance, without being pinned to the collet, but merely sprung on, as the centre should be small, and the time of vibrations counted. It will be seen if the spring is the exact strength, and if so, and the exact size, it should be pinned in so that the inner and outer ends of the spring terminate exactly at the same point, forming a complete circle, or what is termed "equal turns."

If the spring is now pinned to the collet, and the collet put on a small arbor, by moving it round alternately in the callipers and turns, it will be got true and flat. If for a Breguet-spring, the outer coil must be turned up not less than a whole turn; it should be bent upwards and over in a very flowing curve, carefully allowing what Mr. Henry Phillips Palmer, in his valuable price-essay, calls "ellow-turns." It will be seen in all springs of this form applied to Swiss watches. The end of the over-coil of the over-coil should run into the stud-hole before being pinned in, and if of the latter kind is screwed into the cock without the balance, it will easily be seen if the jewel-hole is in the centre of the hole in the spring.

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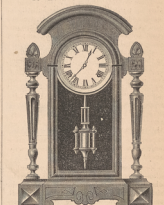
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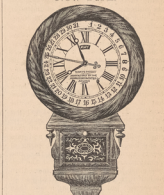
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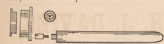
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a pivot and shoulder to fit a small hole in the box, and projecting a very little way through fit should project through the bottom of the box the exact width of the wire to be used for the spring. Tap a small hole in the centre of this winder; pivot and cut three thin slits in a triangle to receive the ends of the wire, of which the springs are to be made. Drill three holes at equal distances through the rim of the spring-box, close to the bottom, through which pass the wire and fasten the ends with a screw into the hole in the winder; the head of this screw should project through the hole in the cover. The cover is to be put on the box as pressed down during the process of winding the springs up, until the box is full; the ends of the wire cut off, the screw removed from the centre, and the winder taken away. Bind the cover tightly down with wire, stop the hole in the centre (an animal charcoal and soap will do for stopping and harden the whole in the usual way. Water is better than oil, as the lower the temperature at which they are obtained the better the springs will be. If the box is now put into a small vessel (an old metal soap pot will do) filled with oil, and held over the spirit lamp until the oil catches the flame, and the box is left to cool, they will shake out of the box quite easily, and you now have three springs that, even in this state, are as good as finished. The ingenious Swiss things called hardened and tempered springs.

If the air is effectively excluded, the process of hardening will not destroy the steel much, and tempering in oil very little, therefore little time is required to polish a spring carefully made after this manner.

Polish them in the following way:—Take a piece of wood, or large match, make into a cone at one end, put a pin into

collet, as it should be. This spring should also be pinned in so that the inner and outer coils will form a complete circle.

The isochronism of the balance-spring is a subject bristling with controversy; but, as I am writing this with a hope that it may be useful, I will avoid theorizing as much as possible, and treating it from my own personal experience. There are, however, a few dogmas in the way which I must notice.

First comes the venerated axiom of Dr. Hooke, "*Quiescit sine vi*," which is not quite true of balance springs of watches, else every spring would be isochronous. There is, again, an absurd theory, attributed to the late Mr. C. Frodham (recently repeated in your Journal) that every length of spring has its isochronous point; and, in a recent prize-essay, the writer, Mr. Imnisch, says, "every one with some experience in timing, knows that mere length has absolutely nothing to do with isochronism."

Now, I assert that length has everything to do with it, and I am not "copying the statement from books," as I know of no books in which the statement is made, but am making the statement from my own experience; and, first—I affirm that a spring too short, whatever its form, will make the short arcs of the balance's vibration be performed in a less time than the long arcs, and that a spring too long will have just the contrary effect; and for this reason, if you take a balance in its place in the watch with a spring of ten turns (a length often prescribed) and move the balance round half a turn—you will find that while the inner end of the spring, being pinned to the collet, moves round in the same circle as the balance, the outer end being fixed, the disturbance in the spring taking place first in the inner coil has gradually affected the fixed and rigid end, and in a spring of this length (especially if it is a hardened spring, and therefore more elastic) the maximum resistance of this fixed end has been reached, or nearly so, therefore if you move the balance one quarter of a turn in the same direction, you have added little or nothing to the resistance, and the spring has not force enough to throw the balance back through the longer arcs in the same time; that is, it would have gone through the shorter. Therefore, I assert that a spring with ten turns is too short, and in consequence, a watch with a spring of this length will lose in the short arcs and gain in the long arcs. Now take a spring of twenty turns, and go through the same operation, and you will find that the balance must be moved through more than half a turn to disturb the fixed end of this spring; but as the spring is more than double the length, it is also thick in proportion, and when the disturbance reaches the rigid end, it exerts a force sufficient to carry the balance through the longer arcs in a shorter period than before that force was added to the action. I repeat, then, that a flat spring with ten turns is too short, and one with twenty too long; that the spring with ten turns will make the same watch go fast in the short arcs, and the spring with twenty turns slow in the short arcs. I find the best length for a flat spring to be 14 turns; and if it is half the size of the balance and pinned in, as before directed, the time will be pretty near in position; but although the flat spring is the most common, it is also the worst form of spring; it cannot expand on the side next the stud, but has a dragging, lateral action, while it throws out on the opposite side to a considerable more than its proper size, causing a violent pressure of the balance pivots on each side of the holes alternately. It will assist the action of this spring if it is always a little small, as this gives more freedom to this portion of the watch, the just wide enough apart to let the spring just move between them, and no more, and should never be far from the stud; and as "manipulating," as it is termed, the watch, really does little, he object of lengthening or shortening the acting length of the spring, this should be accomplished in the proper way at once, by adding or taking away weight from the

balance. Should the watch with the spring referred to, gain a few seconds in the short arcs, taking up the spring half the width of the stud, and replacing two of the balance screws with heavier ones, will remedy this defect, and should it do the reverse, that is, lose in the short arcs, by taking a very little off the weight of the balance, and letting the spring out so much, the error will be corrected, that is, if the error is in the spring, but no directions will enable any one to make a watch go well, with bad pivots, bad holes, and large and bad lever escapements.

The longest spring, although differing very little in form from the flat spring, is essentially different in action and principle, the over-coil being fixed above the spring and nearer the centre gives it perfect freedom to expand in a circle all round. This spring must be much longer than the flat spring, as the force of the outer or fixed end is sooner reached, and the curve inward gives it more power of resistance, and also an easy and perfect means of obtaining isochronism. I find from twenty to twenty-two turns the best for this spring, and curbspins should never be used with it if perfect time-keeping be aimed at. I would also warn any one against attempting to alter the shape of the pivots of the balance staff; there is only one shape for pivots, and spoiling the pivots is not isochronizing the spring. This remedy is nearly as bad as putting the balance out of weight, and is resorted to in positions. My theory is length, and length alone, and this theory seems to me to be in perfect accord with the result of good man experiments on this subject, most of them pursued unconsciously. As, for instance, the tapering of the wire before making the spring, and again, in the contrary direction, where what was termed the isochronous stud that is, a long spring (stud) was used; and I have actually seen these two remedies applied to one watch, when the result might have been obtained by a spring of the proper length.

I need not mention any of the other forms of spring in use—they are beyond the scope of the present paper, but they are all governed by the same laws, and their action is nearly the same as the Breguet spring. There is still a feeling in favor of the cylindrical spring for pocket chronometers, as imported from old associations, and as there is generally room to get a spring long enough in it is a very good form.

But when the great merits of the Breguet spring (properly made) for pocket watches are better understood, it will doubtless be more generally used than at present, as higher-priced watches that can be relied upon for keeping correct time are every day becoming of greater importance. I shall, perhaps, be told that adopting a good deal of what I have said means higher-priced watches. No doubt it does; and I cannot help thinking that the reasons why fewer really good watches are sold in England than in the other countries, with the title of it wealth, must be sought for amongst the makers and sellers, and not the buyers of watches. "Time is money," more now than it has ever been before, and where so much is spent in art and luxury, why should excellence in watchmaking be the only excellence not worth striving for?

I do not think what I have said will enable a person that has no title to the name of watchmaker to spring a watch. There is no royal road to the art of watchmaking more than to any other, but I am afraid it is too much the feeling amongst a portion of the trade to look for information from books and what is called "trade secrets" which can only be obtained at the bench. I can, however, there is information in this paper that ought to be useful to those who are not called "trade secrets" of much thought and labor to myself. I believe I have made it quite clear what is the principle of isochronism in the balance spring, and that isochronism is to be obtained, and, I hope, exploded the greatest of these trade mysteries, that are the very meanest things associated with watchmakers.

D. GLASGOW.

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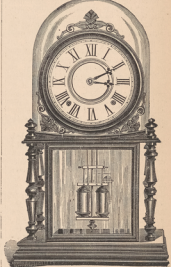
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Practical Hints on Watch Repairing.

BY EXCELSIOR.—No. 4.

(34) You next lay the balance-hair on the bench before you bottom upwards, and with the regulator pretty well back towards the "slow," and selecting a hair spring which you deem suitable you place it on the bridge so that the centre will come exactly at the pivot-hole. Furthermore, the elbow or bend at the point of attachment of the spring to the collet must lie nearly in an imaginary straight line drawn from the pivot-hole to the hair spring stud, for it is customary to avoid fractional parts of coils in fine spiral springs, as much as possible. In doing this, allowance must be made for any cutting out of the coils at the centre, to make the spring fit the collet, and for any bending at the stud, as spoken of in (16), if either will be necessary, calculating as closely as convenient the point where the elbow of the inner coil will come after that shall have been done, and that point must be placed in line with the stud—the centre of the spring remaining over the pivot-hole, as before described. Then note the particular coil which lies naturally between the regulator-pin and the spring is so placed.

(35) Having now attached a small piece of wax to the balance-staff, just below the shoulder of the inner pivot, you stick the inner end of the spring to this wax, making a temporary but firm connection between the spring and the staff. Adjust the spring so that it will stand centrally and truly on the staff, then grasp it with the tweezers about one-eighth of an inch back of the point where it lay in the regulator pins, and, while the lower pivot rests on some hard, polished surface, you hold the balance upward by means of the spring, and cause it to vibrate. Care must be taken not to get so large a motion as to loosen the spring in the wax. By holding the coil in the tweezers pretty high, the spring can vibrate without coming in contact with the coils outside of the one held in the tweezers. The hand is rested on some convenient support.

(36) Everything being in readiness, you set the balance in motion, and count the vibrations it makes in exactly one minute. It will be much easier if they are counted only in one direction, as from left to right; then double the number. As already stated, if you have a case in making the proper number of vibrations you can try your spring beside that, causing the two balances to vibrate together at first, and notice whether your spring lags behind or goes ahead. In either case, count the vibrations from the start till they come together again. If your spring loses a beat or gains one in fifteen seconds or less, it is certainly not suitable. It should not lose or gain more than a couple of beats in a minute. In the case of an American movement, you can rest the balance-pivot on the glass cover of the movement-box, directly over the balance going beneath, and readily compare the two.

(37) If the spring does not give very nearly the desired number of vibrations it is removed and another tried, and so on till one is found which meets the above requirements, when, in the case of a plain spiral spring, it may be pinned to the collet for a final trial. Aside from the convenience of using as described, for preliminary trials, there is a grave objection to pinning the spring to the collet at first. Coils differ much in size, and if a spring was cut out at the centre to fit properly on a large coil, it would be greatly injured for any watch with a smaller one, if it did not happen to fit the one first tried. But with the temporary was fastening no injury is done to the spring if it proves unsuitable. If it will be necessary, when pinning it to the collet, to cut out considerable of the inner end, a small length must be allowed at the outer coil to compensate for this shortening at the centre—otherwise the watch will be out of gain time. Springs are generally made small enough to fit the smallest collets, and often require considerable cutting to go on a large one. And if this additional work outside, when allowed for, would make the spring too large to be freely in the regulator-pins, it must be rejected.

This can be ascertained before cutting it.

(38) The manner of pinning it to the collet is important. There should not be a large vacant space at the centre of the spring, but the inner coil should be only far enough from the collet to avoid any danger of touching it, even in the longest vibrations—but it must not be too close. We often find springs with the inner coil actually hugging the collet—a certain proof that the watch has been in the hands of a hench. Either end of the pin sticking out so that the coil can hit it, is another evidence of botchwork. The inner end of the spring should be put into the hole of the collet as directly up to the elbow, where the spiral joins on the curved portion. From the elbow the curve should diverge from the collet in such a manner that it will meet the regular spiral form in about one-eighth of a coil from the elbow. This is better than running the spiral itself up to the collet, except when the coils are very wide apart, in which case the spiral should reach and be pinned directly to the collet. If the spring diverges too boldly from the collet, its action will not be good. On the other hand, if it diverges too slowly, it will lie so near the collet as to be likely to touch it when closely coiled up, or a minute speck of dirt wedged in between them would produce the same effect. No portion of the spring, however small, should touch the collet, or on any dirt upon the collet, or on any pin, nor should any coil touch another, even at the extreme end of the longest vibration the spring will make in use. The repairer should examine every doubtful hair-spring that passes through his hands, turning the face with the finger in each direction, and holding it still while looking over the spring. Although a little out of its order here, I would also say that the repairer must not touch anything above, below or around it, except the collet, stud and regulator, and then only at one point. All workmen know that this should be so, but they cannot know whether it is so, unless they move the balance to each extreme and hold it while they look, as above. It is very common for two coils to hit the regulator or the stud.

(39) If, however, there is more space at the centre than is supposed above, the remedy is to cut out a small piece of the regular spiral portion of the spring, but in no case more than 90° or one-fourth of a coil. If that is not enough to reach the spiral with a moderate divergence, the space is too large. The object we have in view is to bring the entire length of the spring, from the regulator to the collet, into action as uniformly as possible. Any considerable variation from the spiral form at the centre causes irregularity of action, i.e., an action different from that of the rest of the spring, and the greater this variation the greater the resulting irregularity. In springs which diverge very boldly, the coil which has a large open space at the centre, this sweep or curve becomes a veritable "terminal curve," modifying the action of the whole spring, always difficult to change or adjust, on account of its position, and frequently delaying every effort to neutralize its injurious effects upon the isochronism. It is even necessary sometimes to make the coil larger, as heretofore noted.

(40) In the spring many workmen fasten the end "any way it happens," then bend the central coil up or down to make the spring stand truly, not knowing that as soon as it is fixed it will be thrown out of its true plane by reason of this central twist. The spring should always be levelled before the pin is tightened, so that when fast it will be true without any twisting. The pin should barely reach through the hole, not sticking out at either end, and particularly not at its large end next to the elbow. It should be made either of hard brass or steel, stiff and tapering but little. After filing it up, flatten one side so that it will go nearly as far into the spring in the hole as out, and while both are in the hole mark where it projects from the collet on each side, cut it off at the end, file a notch around it the other mark, then force it to its place and break it off while in the hole. The small end should not be bent, but be flat, so that it can readily be pushed back for altering, if necessary.

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(41) For this purpose you want a special pin-punch, made from a short needle, perfectly flat on the end, and firmly fixed in a stout handle. While pushing the pin in or out of the collet, you should hold the latter flatwise (the hole being outside of the end of the jaws), in a pair of pliers held with each iron cover—by which you can hold it firmly without any need of marring it. The jaws also serve as guides in getting the spring flat. To try it, slip the collet on an arbor, and revolve it in the turns, either with a bow or with the fingers, noticing both the flat and also that the coils rise evenly from the centre to the outside. But if, as your eye runs along the coil while it is turning, there seems to be any waving or "bobbing," the spring is not concentric with the collet, and must be made so by altering the central coil. Being true both in the flat and in the coil, you now put the collet on the balance-staff, and again try if the spring is flat and true, by whirling the balance in the turns, or even between the thumb and forefinger. The collet must be adjusted on the staff at such a height that the spring, when pinned in the stud, need not be perfectly square. If the collet end of the spring is higher or lower than the hole in the stud, the centre will be bulged up or down, and satisfactory action will be impossible. It is important, for this reason, that the balance-staff itself should have no more end-shake than necessary.

(42) Before pinning the spring in the stud, you now verify its proper length more closely, by again counting the vibrations while holding it with the tweezers, remembering that the point which is to go in the stud should be about one-eighth to one-fourth of an inch beyond the place where it gives the correct number of vibrations in the tweezers. This is all that is required for the regulator. The exact distance will be about one-third less than the actual distance from the regulator to the stud, along the coil. Having placed that point over the hole in the stud, while the pivot is in its jewel hole, the outer coil should lie freely in the regulator, and the elbow at the collet should be about in the line between the pivot and stud, as already described.

(43) If the elbow varies much from this position, the isochronism of the spring will be more or less defective. Although the time shown by the watch at the end of each 24 hours may become correct, by dint of regulating, it will not be correct at any previous period,—nor afterwards. In case the watch is allowed to run over 24 hours before rewinding. It will either gain in the first 12 hours and lose in the last 12, or the reverse, making a correct average for the entire 24 hours. Such watches must be wound regularly, at precisely the same hour each day, to secure even fair time. And in regulating them must be timed at the end of each 24 hours, and at no other time during the day, as that would damage the regulation instead of improving it. But no watchmaker has to care for his regulation should let a job go out in this condition. The correction of this error will be fully treated hereafter.

If the spring has been fitted as I have directed, you may proceed to pin it to the stud with full confidence that it will perform satisfactorily. It should not have been done before, because at that point in the stud there is always produced a bend or crimp, by the pin forcing it to conform in shape to the hole, and if it should afterwards be necessary to let it out and bring the crimp into the acting portion of the spring, that stiff point would interfere with perfect performance. Even after the pin has been slid down, it is not so entirely prevent this. Hence it is advisable not to pin a spring unless it is reasonably certain that it will answer the purpose, and then it should be so pinned that it will surely be *long enough*, and that any necessary alteration will be made by taking it up, or drawing it further through the stud, not by pulling it out. In the next article I shall show how a spring may be selected, fitted and partly regulated in the watch before pinning it in the stud at all. But as springs occasionally are fitted and shifted, even after they are fitted, it might be a good idea in fine watches to "them with a flattened pin on each side—

unless some inventor can furnish us a stud with a slot instead of a round hole for the half-spring.

(44) The spring must be pinned perfectly solid, both in the stud and the collet, so that not the slightest change or yielding can occur. The larger end of the pin should be towards the body of the spring, and should not project at all outside of the stud, so that under no circumstances can it affect the action of the spring, as it would do if it extended alongside of it even for a short distance. But the point of the pin may project from the other side of the stud, next the end of the spring for convenience of pushing out and also turning it with the pliers, to level the spring perfectly before making it fast. Enough spare spring must be left, when broken off, to have at least one-eighth to one-quarter of an inch beyond the stud, after the watch is regulated, to provide for future contingencies requiring it to be let out.

(46) If the stud-hole in the bridge is further from or nearer to the balance jewel-hole than the regulator pins are, as sometimes happens, it must be bent near the stud to bring the outer coil within the circle of the pins as soon as possible, as, throughout the sweep of the regulator, the spring must be *free* of all contact with the pins, or against either one of them, when the balance is at rest. If there is a considerable space between the pins the spring should stand in the centre of it. The position of the spring should be tested by screwing down the balance-bridge in its place and moving the regulator each way. Sometimes the regulator cap or one piece gets reversed on the wrong way and causes the pins to stand further in than they should. If this is the cause of the trouble, reversing the cap will throw the regulator farther out and obviate the need of bending the spring. But if it must be done, the bend should not be too abrupt at the point where the outer coil is made to become concentric with the regulator, but should be made far enough from the stud so that the change of direction it produces in the spring at that point will not be more than about 15°—never over 25°.

(47) When it is correct, take the balance-bridge off, and lay it bottom upwards, having taken the stud out of its hole, place the pivot of the balance in its jewel, and hold the staff nearly upright with the tweezers. Then the spring should lie naturally in the regulator pins, while the stud must hang freely directly over its hole and must point straight down into it, which will show that the spring is properly pinned and correctly shaped. If it is not as described it must be made so, for the spring must have exactly the same form when loose as when it is secured in the watch for running, so that it may stand free from any twist or outside contact during its vibrations. This is indispensable to its good performance. When the stud is a heavy bar the above test cannot be applied, and the consequence is that the stud should be removed from the staff, and the bar screwed in its place, when the collet should naturally come exactly concentric with the balance jewel-hole. If not, the spring should be bent to bring it so. We often see springs that are too large, with one side spread out, while the other is compressed within narrow limits. Also springs twisted sideways at the stud, to go over and under a centre wheel, and many similar makeshifts. Such jobs may be excusable when the watchmaker has no price for which the watchmaker can afford to do the work properly, but they should be given to understand that good service cannot be expected from such work.

(48) In taking out the stud we often see workmen use a knife to pry it up, and if it should come up more easily than was expected, the knife-blade suddenly slips across the bridge, and off goes the pivot. Tweezers have been made for pushing out studs—also pliers for the same purpose. But as good work may be done with the arm of the bridge upon any convenient square-edged block of metal, say an inch thick, to allow the balance to hang down from the stud, or rest partially on the balance, while you give the stud a pull above with a pin-punch of suitable size. As the end of the arm is supported by the

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top of the block, close up to the stud, which is in contact with its side, it is very easy to hold the bridge level under any amount of force required for pushing out the stud, without the slightest risk to any part.

(46) Putting the watch in beat is an operation that frequently troubles beginners, and sometimes even those who are very far from being beginners. I will therefore give directions for so much as relates to the hair-spring. Errors in the escapement, etc., will be treated in their proper places. When the power of the movement is cut off and the balance at rest, the position of the parts should be as follows:—In the chronometer, the unhooking lever should stand just on the outside of the unhooking spring, i. e., not on the same side as the escape-wheel, or the unhooking side, but on the opposite side. In the duplex, the slot in the roller-jewel on the staff should be in a line from the centre of the staff to the centre of the escape-wheel. In the detached lever, the ruby pin should be in a line between the centre of the balance-staff and lever-staff, or "pallet arbor." When the hair-spring stud is fixed to the balance-bracket, turn the regulator so that it will point to the lever-staff, while the bridge is screwed in its place. Then the ruby pin is easily put in line with the regulator while the balance-bracket is lying below upwards on the bench and the balance-pivot in its hole, and got very close before the spring is put into the watch at all. Then it can be tested by "sighting" or by placing a blunt screw-driver against the fourth wheel, or the one which carries the second-hand, and moving it very slowly so that the balance will vibrate as far in each direction as the lever carries it but no further. Notice the position of the arm, or a screw in the rim, at each extreme, then turn the collet so as to cause it to stand at a point midway between them when at rest, and it will be in beat.

(50) In the horizontal or cylinder escapement, the stud should be in line with the two impulse lips of the cylinder. But if the mechanism is not in its normal condition, and the watch does not prove to be in beat, upon trial, take your oiling wire or a stiff bristle and with it move the balance very slowly each way till the escape-wheel tooth drops, but by doing so, noticing the position of the banking-pin on the rim at each drop. Then place the pin halfway between these two drops, and hold the balance there while you "sight" a line through the centre of the stud to the cylinder-pivot, and identify the point on the rim of the balance which is in that line, by means of some mark or stain, etc., or its distance from one of the arms, or in any other way. Then take off the bridge, remove from it the balance and stud, and turn the collet so that the stud will hang naturally in that line from the mark on the rim to the cylinder pivot, when the balance is held horizontally, and the watch will be in beat, provided the spring is not forced out of its normal shape when the stud is fastened in its place.

(61) Most workmen use a screw-driver or a knife-blade to shove the collet around with, and unless they move it very carefully it will slip off and "jab" into the spring; or it will pry open the cut and loosen the collet, rendering the watch liable to be thrown out of beat by the force, or even by running, making it unstable for time and likely to stop. A tool can be made in a few minutes which will turn the collet without trouble or danger. Take a thin piece of steel, say a piece of the main-spring of an English lever watch, one-eighth of an inch broad, and hollow out the end into two claws or prongs—a long one on one side, and a short one on the other. The latter should point towards the end of the former, and the long one as to hook into the cut in the collet, while the former rests against the side of the collet. It is used by placing it flatwise on the spring, pressing it lightly against the collet, and pulling, not pushing, with the short claw in the cut. Mount it in a light handle, and keep the short claw in good condition and a little under-cut.

(62) When everything is done, so that you are sure you will not have to take the watch out again, a little oil may be put to the jewel holes—they and the pi-

voets being, of course, perfectly clean. Put in barely enough oil to fill the holes, but not stand at all in the oil-cup or concavity of the jewels. If it seems to be soon drawn away by capillary attraction between the jewel and the end-stone, put in a little more. But put no oil on the pallets of a verge; a very little only on the long impulse jewel in order; a very little on the pallets of a lever watch, but none on the ruby pin nor in the fork of the lever; a little on the roller-jewel of a duplex staff, but none on the impulse pallet; none on either the unhooking or impulse jewels of a chronometer, none on the detent-pallet, and but little on the balance-pivots. Use the same, or the very best watch-oil to be had at any price. Keep the bottle closed in the dark; keep your oil-cup perfectly clean and covered; put but little oil in it at a time, and fill it often with fresh, wiping it perfectly dry and clean with paper every time you fill it. Make an oiling-wire by taking the temper out of a sewing-needle, file it tapering to a point as fine as a hair, then turn over the extreme end, and make the smallest possible loop or ring so close that you can see no hole in the centre, and mount it in a light handle. This loop will take up all the oil that any ordinary hand could use. Keep it away from soldering fluid, water or dirt, and keep it out of your mouth. Of course, if the balance, spring, etc., are at all greasy or dirty, they should have previously been hung on a wire hook and moved about in a bottle of benzine for a few seconds, then dried by exposure to the air.

(53) Having now put the movement together, with the hands on, set it to seconds and run it for exactly one minute, changing the regulator till it is correct. Then try it for fifteen minutes, and it is about right if it may be put into the case and hung up for the final regulation. Although I have dwelt upon a large number of details, the workman should remember that it will take but little time to do his work rightly, if he understands how to do it to be—and it has been the object of these explanations to clearly show the proper method, so that when his work is done it will be correctly done. The isochronal adjustment of the spring will be treated hereafter; also, testing and correcting the rate of the balance. I am aware that there are plenty of blunder-heads in the trade who will dispute this or that proposition, but they may not agree with their theory or practice. I can assure the reader, however, that the directions given or to be given may be relied upon, and are approved by those best qualified to judge in these matters.

The Royal Jewels of Persia.

I went, says a recent writer, with the Turkish Minister, an Italian, and a Russian lady, to see the Shah's jewels, which are certainly the greatest sight in their way that the world can show. We presented ourselves at the palace and were received by Yahya Khan, who took us out of the second and inner great court of the palace into a small quadrangle, not far from the sacred precincts of the harem. We then went up a steep staircase to a small room about 20 feet by 14, where jewels to the value of \$6,000,000 or \$7,000,000 were laid out on carpets at the far end of the room. But I remember that at the back of the magnificent Mamalik, or Persian Chancellor of the Exchequer, and being a Sayid, wore the sacred color.

In such a show of gems as seemed to realize the wonders of Aladdin's lamp, the eye was too much dazzled and the memory too confused for description to be possible. But I remember that at the back of all was the Kaianian crown, and on either side of it two Persian lambskin caps, adorned with splendid growths of diamonds. The crown itself was shaped like a flower-pot, with the small end opened and the other closed. On the top of the crown was an ancient ruby apparently without flaw, as large as a hen's egg. In front of the crown were dresses covered with diamonds and pearls; trays with necklaces of pearls, rubies, and emeralds, and some hundreds of diamonds, ruby, and turquoise rings. In front of these, again, were gauntlets and belts covered with rubies and diamonds, and conspicuous among them, the Kaianian

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an belt, about a foot deep, weighing, perhaps, about eight pounds, and one complete mass of pearls, diamonds, emeralds, and rubies. Still nearer to us stood a drinking bowl, completely studded with enormous jewels; a tray full of foreign orders set in brilliants, and in front of all lay a dozen swords, which are worth a quarter of a million each. Along with these were signets, covered with diamonds, and armlets so contrived that brilliants revolved and kept up a continuous scintillation.

It is difficult among so many to single particular gems. Perhaps, however, the first place ought to be assigned to the famous "Darya-i-Nor," or "Sea of Light," the sister diamond of the "Panjah trophy," the "Koch-i-Nor," or "Mountain of Light." It is an inch and a half long, an inch broad, and three-eighths of an inch thick. It has the name of Fath Ali Shah on one side, and the inscribing this name reduced the value of the diamond, so at least said Yahiya Khan. It is a monstrous diamond, but not very brilliant. The Persians say that the "Sea of Light" and the "Mountain of Light" were jewels in the sword of Afrasiab, who lived 3,000 years B.C. Rustam took them from Afrasiab, and they continued in the crown of Persia till they were carried away by Timour, from whom they descended to Mohammed Shah, King of Delhi, and Nadir brought them from India, but when he was slain, Ahmed Shah Abulhi carried off the Koh-i-Nor, which descended to Shah Shuja, and was taken from him by Runjet Singh. The Darya-Nor remained in Persia with the greater part of the other gems that Nadir brought from India.

Among the rings is one in which is set the famous Pitt diamond sent by George IV. to Fath Ali Shah. Another very large diamond is the Taja Hama, or the Diadem of the Phoenix. It seemed as big as the top of a man's thumb. This is also the finest turquoise in the world, three or four inches long, and without a flaw, and a smaller one of unique beauty, three-quarters of an inch long, and three-eighths of an inch broad. The color was lovely, and almost as refreshing to the eye as Persian poets pretend. There are also many sapphires as large as marbles, and round pearls of the size of nuts; and I am certain that I counted nearly a hundred emeralds four, half an inch to an inch and three-quarters long and an inch broad. In the sword scabbard, which is covered with diamonds, there is not a single stone smaller than the nail of a man's little finger. Lastly, there is an emerald as large as a walnut, covered with the names of the kings who had possessed it.

Engraved Gems.

HISTORY OF THE GLYPHIC ART.

By C. W. KING.

From Asia Minor to Greece Proper the transition of fashion was expeditious, and the signet, now for the first time worn mounted as a *fingerring*, came into universal favor amongst all the Hellenic population. This was a new method for securing the engraved stones for the original inventors of seal-engraving had worn and continued to wear, down to the very close of their history (even to the date of the Arabian conquest), the cylinder or the conical seal as the ornament of the bracelet or the necklace. In fact, the curious necklace regularly borne by gods and royal personages in Assyrian sculptures appears to be entirely made up of cylinders separated by round beads. This explanation is supported by the practice, double tradition, and the analogy of the seal as thus utilizing, as an adjunct to other beads, all the antique cylinders picked up by them in the ruins of Heliopolis, Khorsabad, &c.; a fact which, until lately, was the only source supplying archaeologists with these interesting relics. This primitive mode of carrying about one's signet seems, as the descriptive testimony of Herodotus alone quoted shows, to have been in the first instance the usual one with the Asiatic Greeks; they had, however, modified the shape of the gem into the *seal-ring*, an elliptical disc convex at the back and perforated through its axis; a convenient pattern, the mean between the

Persian cone and the Egyptian scarabæus. This fashion appears to have been first devised and made popular by that practical people the Phœnicians, to judge from its general use for signets, whose devices are in their national style. Its general adoption by the Ionians is established by one conclusive example upon a painted vase (figured by Visconti). Jupiter himself appeared with his imperial signet thus shaped, and tied round his wrist with a fine string.

Mythologists told an ingenious fable to account for the origin of the *fingerring*. Jove, upon loosing the Titan Prometheus from the bonds to which he had been condemned to eternity, obliged him as a penance, as a recompense, as an equivalent to his original sentence, to wear for ever upon his finger, a link of the chain enmeshed with a fragment of the Caucasian rock of torture. Thus ornamented, Catullus introduces him at the Wedding of Peleus.

"Came wile Prometheus, on his hand he wore
The stender symbol of his doom of yore,
When fettered fast with adamantine chain
Hung from the craggy steep, he groined in
adverse pain."

That this invention should be ascribed to Prometheus, a Grecian hero, goes far to prove that this latest and most permanent fashion was purely an innovation of the Greeks. Besides this, we have the express statement of Pliny, that the use of the *fingerring* was introduced amongst the Romans from Greece. The conservative lateness of the fashion is also indicated by the fact that all the Greek intagli in the Archaic manner are found upon gems shaped like the *seal-ring*. Actual seals, but have been discovered in the Greek islands; and although many of these may have been imported by Phœnician or Etruscan traders or colonists, yet a few are known of indisputable Hellenic origin. The strange corruption of the commonest Greek names to be seen on the most finished works of the *Alcassone* engraver betrays the efforts of an Oriental tongue to express sounds entirely new to it in a novel alphabet, whereas the very rare scarabæi in question exhibit the names of their proprietors, written according to the correct though antiquated spelling, intended to read from right to left on the *impression*—a convincing proof of their very early date. Of these, the finest example is the one with the type of a beetle with expanded wings, discovered by Finlay the historian in a tomb in Egina; and another from the plain of Troy, finely engraved with a girl kneeling at a fountain.

But whatever their nature, signets of some sort or other must have been in general use amongst the Greeks 600 years before our era; for, shortly after this date, we find Solon enacting, amongst his other laws, that the *gem-engraver* (already, therefore, constituting a distinct profession) should not keep by them the copy of any signet once sold. The object of this regulation was to prevent the fraudulent use of another person's seal through the obtaining a counterpart of the same from its engraver. About this date also Herodotus mentions the famous emerald signet of Polykrates, and the celebrity of the man who engraved it, Theodoros the Samian, as a jeweller and a worker in metal. It may be remarked here that this island, Samos, was the focus of the glyptic art, as far as Greece was concerned. Accord'g to the records, now lost, to which Apuleius had access, Menesarchus, the father of Py. diagoras, (i. c. 370), "amongst the sedentary artists working there, sought rather for fame than for riches by engraving gems in the most skilful manner."

The Etruscans, or, as they called themselves, the *Rusini*, were of a race very distinct from the Hellenic, as their language proves, which has more analogy to the Armenian than to any other, although there is no doubt that Lydia was their latest seat, and their ruling family of Assyrian stock, for the kings styled themselves *Sardoniades* as the descendants of *Sardos*, the Heracles of the Babylonians. Nevertheless, they speedily adopted Hellenic culture and art, and that to an extent infinitely greater than any other foreign race in those times. The *seal-ring* was then due apparently to the colony of Pelasgic Tyrrhènes, driven out of Southern Lydia (Ionia), and which settled in Italy

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around the cities of Cere and Tarquinii. The latter place long maintained its rank as the metropolis of the Etruscan confederation, and ever remained the principal channel through which Greek civilization flowed into the rest of the country, chiefly from Corinth, the city of potters and metal-chasers. Besides, the Etruscans acquired their taste for Hellenic art through their intercourse with the Dorian colonies in Lower Italy, especially after they had themselves gotten a settlement at Vulturnum and Nus; as well as, still later, by their direct trade with Corinth and Phœnix.

This wealthy and luxurious nation (infamous on both accounts among the poor and ever-reverent Greeks, as the stories Titianus relates about their heinous manners sufficiently indicate) were eager to decorate their persons by every means imaginable, and consequently were passionate lovers of jewelry. From the earliest period of their national existence they gave employment to a multitude of engravers in "fine stones." The majority of the subjects upon their gems, and particularly those the most archaic in style, are proved by the localities where they are discovered so plentifully now, and still more by the strangely-distorted spelling of the Greek names in the legends occurring upon some of their number, to be beyond all question Etruscan works, and not old Greek imports from abroad, as some archaeologists have endeavored to establish.

These intagli display the steps by which the art advanced, from the production of the simple composed entirely by the juxtaposition of drill-holes up to those executed in the most elaborate and highly finished manner, and which exhibit marked vestiges of the extensive employment of the diamond-point. In the highest style attained to by the Etruscans, their gem-work combines a wonderful delicacy of execution with a love for violent action and an exaggerated drawing of the muscular parts of the figures introduced—considerations that often seem to have dictated the choice of the subjects.

The distinctive character of art amongst the early Greeks and the Etruscans cannot be better described than by quoting the masterly definition of Winckelmann's when remarking of the famous Tydæus of the cabinet: "Caracalla, Tydæus, one of the seven heroes of the Argive League against Thebes, who, having received a wound, is slaying the dead out of his right leg; with his name in Etruscan characters." **TVT.** The intaglio of the Five Heroes, as I have stated, the most ancient monument of the art in general, this gem is assuredly one displaying the highest perfection of the same art amongst the Etruscans. It is executed with a precision and delicacy which yield in no point to the finest Greek engravings. Here we are enabled to do more than merely form conjectures as to the state in which the art was at that period; nay, we can decide upon it, as it were, without risk of error, and by combining the lights furnished to us by the other Etruscan monuments, we can determine by the means of this figure of Tydæus the character and peculiarities of design among the Etruscans.

"The proportions of the figure in general are here already established upon the rules of harmony, declared by them from the study of Nature in her finest form; and the figure is finished and easy to quite the same degree as the most beautiful Greek statues. The engraver's profound knowledge of anatomy is everywhere conspicuous, each part is in its own place and is marked out with sureness; and in truth the subject chosen by the artist was of a character to display the entire perfection of the study he had pursued of Nature. The acute pain felt by Tydæus and the efforts that he makes to pull the dart out of his leg demand an attitude full of violence, with all the muscles in motion and under irritation. And this was precisely the limit of the skill of the master, who had not advanced as yet, as far as the notion of Ideal Beauty. In fact, the head of Tydæus presents neither nobleness nor elevation of feeling, the idea of it is borrowed from ordinary nature. Another defect is that by the effort of the artist to show off so ostentatiously the whole of his anatomical knowledge, he has become ex-

aggerated and stiff; all the parts are too strongly marked; and though the pain by which Tydæus was agitated demanded that the muscles should be swollen, yet the bones are too distinctly shown and the joints too loose and strained. To give an idea of all this to such as may not have the opportunity of seeing the gem or even the impression, I venture to compare this figure with the drawing of M. Angelo; there is the same relation between the manner of our figure with the Greek as between the drawing of M. Angelo and Raffaello's. The drawing, however, in this work must not be regarded as a personal peculiarity of the artist individually; the stiffness of the outline and the exaggerated rendering of the parts was the character of the Etruscan art in general.

To be continued.

Official List of Patents

Prepared by Louis Dwyer & Co., Solicitors of Patents, Washington, D. C.

Issued by the U. S. Patent Office for the month ending June 4th, that relate to the arts and manufactures represented by the JEWELER'S CIRCULAR.

102,321—Watch Cases, Francis Sheffley, Brooklyn, N. Y.

Brief.—In stem-winding watches the cap is cut out in the center, and provided with a ring having an inward and upward extension on the inside of the cap, in combination with the bezel, whereby material is saved, and the recess formed for the insertion of one or two jewels.

102,324—Machines for the manufacture of watch cases—C. L. Thierry, Boston.

Brief.—On the rotating disk are arranged four rolls, of which the carriages are vertically adjustable radially and vertically. The cup-shaped blank is clamped by the dies. Two of the rolls roll on the edges of the cup and upset and thicken the metal, while the other two rolls roll the metal against the former die. All the devices operate automatically, except the plunger that carries the former die.

102,430—Clocks—R. H. Strong, Galesburg, Ill.

Brief.—A main drive wheel, carrying a dial indicating fractions of an hour, gears with a pinion on the escapement, and is thus revolved once in each hour. A tappet, which is actuated by the pinion of the dial, indicating hours, moving it one space at each revolution of the main wheel.

102,444—Metal Turning Lathes—Thomas Wilhelm, Philadelphia.

Brief.—The combination of the face plate of an ordinary lathe, with adjustable supporting pulleys.

102,542—Construction of Watch Movements—James H. Flynt, Duluth, Minn.

Brief.—A watch movement in which motion is communicated from the main-spring barrel to the escapement wheel through a single pinion and wheel, said wheel being in the circumference of the pillar-plate, and arranged between the face and the pillar-plate.

102,586—Modes of Inlaying Jet with metal, Wm. Sherrin, Newark, N. J.

Brief.—The process of inlaying jet with metal, consisting in the application of a guard-plate perforated with the desired design to the table of jet, the barring of a matrix in the jet by heated dies, which are passed through the guard-plate perforations, and the application of cement and an ornamental device immediately after the removal of said instruments.

103,125—Clock Escapements—George W. White and W. J. Leary, Edenton, N. C.

Brief.—Plates provided at their ends with hooks, the shanks of which are pivoted to the plate, in combination with a wheel, provided with detents or teeth.

103,161—Mainsprings for Watches—Jno. A. Dawson, Boston.

Brief.—A mainspring safety attachment, consisting of a supplemental piece attached to and swinging on the outer end of mainspring, to engage in a recess in the barrel, and act as a stop-work for the winding mechanism.

103,424—Methods of bookbinding Gold Leaf, John Varley, New York.

Brief.—The method of bookbinding gold leaf,

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We wish you to know that we still make nearly 400 patterns of hard solder rings, of every variety of style for men, women and children, that they are struck from 16 karat solid with 10 karat linings, and put together with solder that is 80 per cent. coin silver, and that every ring is as fully finished as the best Diamond work. They are all stamped and warranted to give entire satisfaction. We ask of you to make a trial of them, assuring you that they are the most hard-solder ring yet made, and confidently appealing to scores of the most careful dealers in the country for confirmation of our assertion.

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REISSUES.

6,402—Coating Metals with Metal—Issued Adam, Jr., Boston, Patent No. 57,271, dated Aug. 21, 1896.

Brief—Rendering gas pipes and other similar articles anti-corrosive to heat or moisture, by surfacing them with nickel.

For the Month ending July 4th.

163,680—Watch Regulators—John A. Miller, Paducah, Ky.

Brief—A watch regulator in which the screw operating the regulator arm is attached to the side of the bridge, and connected by a screw nut with the collar of the regulating arm.

163,680—Clamps for grinding watch crystals—A. C. Norton, Monona, Iowa.

Brief—Revolving elastic feed disks on independent axes, in combination with spiral clamping arms, and a clamp screw.

163,604—Main-springs for Watches—C. W. Rice and A. L. Burbank, Worcester, Mass.

Brief—A mainspring having its outer turn or coil constructed with a back and a catch, or their equivalents, so as to form a class or guard restraining and holding the spring when nearly run down, and allowing it to turn backward in the barrel without damage.

163,771—Watch Keys—A. Hathaway, Chicopee Falls, and F. Hathaway, Springfield, Mass.

Brief—A watch key having a revolving cylinder, the ratchet connection between the parts being formed by the friction of a spring in unwinding upon the sides of the cylinder.

163,868—Pendulum Clocks—V. Himmer, New York.

Brief—A clock so constructed that the pendulum will adjust itself in vertical position, although the frame of the clock be inclined.

163,878—Cutter Holders for Metal Lathes, J. R. Mitchell, Haywood, Cal.

Brief—A longitudinal groove extending nearly through the upper part of the holder, permits the top to be sprung down by the screw in the tool-post, and thus clamp the cutter between top and bottom of the grooved way in which it rests. A pin passes transversely across the back of the recess in which the tool is held, and projects slightly to hold the cutter against the outer lip or flange.

164,092—Safety Wheels for Watches—Eugene Jeanjaquet, Springfield, Ill.

164,119—Watch Chain Swivels—Charles Wills, Attleborough, Mass.

164,177—Stud Fasteners—J. C. W. Jefferys, Tottenham Court Road, England.

Brief—The helix is attached to a flat shank, and falls outside of the periphery of the front disk of the button at one side.

164,210—Compensation pendulum—C. M. C. Prentiss, Monroeville, Ohio.

Brief—A compensation pendulum, consisting of a series of metallic rods, each rod suspended from a point between the fulcrum and point of application of the power of a lever, and secured rigidly to a plate at their lower ends, in combination with one or more rods possessing a greater degree of expansibility, the latter rod being connected with the bottom plate, and acting as a power for the lever.

164,309—Spinning Rings—J. G. Lamb, Newark, Conn.

Brief—The annular plate, or upper part of the ring is applied by inserting its edge at one side under one of the lugs, dropped at opposite side, by means of a recess therein, past the opposite lug, and turning it by means of the projection. The shoulders prevent it being turned too far.

164,384—Time Recording Instruments—T. Mayhew, Poughkeepsie, N. Y.

Brief—A time recording instrument, operated by pneumatic pressure upon a friction-brake, in which, when both hands are engaged, the pressure may be applied by a tube placed in the mouth, or exerted in any suitable manner.

164,561—Tool Receipts for Metal Working Machines—Wm. H. Hoffman, Passaic, N. J.

Horological Club Correspondence.

Going Barrel vs. Fuzee

Gentlemen of the Horological Club:

I have collected from time to time at your meetings, a discussion entitled Going barrel vs. Fuzee and Chain, and at your last meeting I notice an explanation of "Inquirer's question," by Mr. Fritz, on this subject, in which Mr. Fritz agrees with Inquirer that watches without the fuzee and chain give as good satisfaction as with them. He assigns his reason to having had fine going-barrel watches which performed as well as the very first class of fuzee watches. He does not say that he tried two equally well finished and well conditioned watches, one with fuzee and one without, for a certain number of hours, say 30 or 32, and they both performed alike. I, therefore, with due difference to Mr. Fritz, and my high appreciation for his inventive genius and great experience, must confess that his experience of the fine performance of going-barrel watches as being equal to those with fuzee is not conclusive. I also hold that Inquirer's "41" cannot be shown to be true, and that there is a limit to the isochronous property of the best hair-spring that ever was made; for were it not so, why be so particular about the quality of the hairspring? Instead of instructing your customer to wind his going-barrel watch every day at the same hour, if possible.

All will agree that a very fine English marine chronometer with fuzee is the most perfect portable time-piece yet produced. It is constructed to run 56 hours, yet the ship-captain is particularly charged by the ruler to "wind at 8 a. m." What is the necessity of it? If the isochronous property of the hair-spring is sufficient to cover the wide range between the largest and the smallest vibrations of the balance in a going-barrel watch, surely it ought to be sufficient for a chronometer with a geometrically cut and well-finished fuzee. As I acknowledge that going-barrel watches are more remunerative to the manufacturers and retailers of watches, are easier repaired, and give good general satisfaction to the best and go-ahead American, I do assert that where fine time is required the fuzee is an absolute necessity; and I would suggest to the unfazed that they need not fear that the fuzee will become a national calamity in this country, for the average American watch manufacturer rather strives how to make a watch as cheap as possible than as good as possible. Hoping you will take my few remarks in as friendly a spirit as I make them, and with my highest regards for your club, and sincere good wishes for your prosperity,

I remain yours respectfully,
S. F. GORNOX.

Going Barrel vs. Fuzee Watches.

Gentlemen of the Horological Club:

Although it may seem ungenerous to strike an enemy already dead struck, I feel compelled to make a few remarks about the fuzee, which I am certainly entitled to call dead considering the fact that at the present time one thousand watches are connected daily with a geared barrel to one supplied with a fuzee. The query of your estimable correspondent, Mr. Fritz, whether a watch without fuzee can give as good satisfaction and go as good a time as one furnished with this ornamental appendage is rather astonishing coming from one so well versed in our profession. Had Mr. Fritz looked over the reports of the State Observatory at Neuchâtel, Switzerland, he would certainly have found a very conclusive answer to his query (let alone the respectable record of our leading manufacturers, Waltham or Howard) for in almost every instance fuzee watches of the best makers have failed to compare in close rates to the geared barrel watches. I have before my eyes the report of the Neuchâtel State Observer for 1872, in which the rates of about 150 best chronometers are given. Not only the four best time-keepers which obtained prizes were geared barrelled, but the only fuzee watch coming anywhere

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near their rate has a variation double from them. Among the number of the chronometers were the detestable both Swiss or English style and the lever escapement both with and without fusee so that the trial was fair in every respect, inasmuch as it also included products of one of the best London makers. It looks to me reasonable to claim that from the day isochronism became a scientifically solved problem, the fusee ought to have disappeared from our five pocket time keepers. It was invented to overcome a difficulty existing before the discovery of the fusee escapement. Even if the fusee could give (which is more than doubtful) an absolutely equal vibration to the balance under varying pressures of motive power, the unavoidable irregularities of gearing, varying density of oil, change of positions, would a full adjustment of the chronometer? If their adjustment is necessary, the fusee becomes useless, as any adjusted worthy of that name can produce a regular rate in a balance vibrating from one turn to three-quarters with main-spring. It would wound up to one turn and a quarter with main-spring in its last turns, and we all know that a common 4 turns barrel will give this result, and a better one if it contains one turn and half of free running above and below the normal 36 hours running. Now the main reason of this superior running of geared barrel pocket time keepers cannot be ascribed to the fusee itself, but to the disadvantage under which it places the other parts of the mechanism. It requires a valuable space in the watch movement to place of a fine train by squeezing the wheels together so that their size has to be diminished, and prevents the easy use of a quiet vibrating balance. It is only to satisfy an imaginary necessity, viz, the perfect equality of motive power, we then are compelled to give up the most valuable features of quick loss, balance and fine geared train. Besides it reduces the size of the balance, a very necessary feature of the regulating power and necessitates the use of a stronger main-spring, thereby increasing the wear and tear of the working parts; it crowds the main-spring in a small space and increases the friction of coils in order to obtain the necessary strength to carry an extra weight wheel. Add to their numerous disadvantages the constant breaking of the chain, the difficulty of manufacturing even a common fusee, and compare the toll and expense required with the negative result obtained, and decide if we had not better abide by the verdict of half a century's experience, and consign the fusee and the verge escapement, its contemporary, to the shades of oblivion, much to the relief of watch tinkers at large, and indirectly to the general improvement of the human race by suppressing a vast amount of profanity daily spent upon that venerable relic of barbarism.

GENEVA.

Trade Societies.

To the Members of the *Biological Club*.
GENTLEMEN—I wish to say in my last JEWELER'S CIRCULAR, Vol. vi, No. 5, where Mr. Francis Boese is still insisting, arguing, and agitating upon the practical workmen of the trade in every State to form a watchmakers' society for the purpose of examining watchmakers and giving diplomas to those who are found worthy, and by so doing wipe the blot out of existence. Now, gentlemen, I wish to inquire of you: suppose there was such a society formed; do you suppose that would dispense with botches, or do watches being botched and slighted, and give our customers any better assurance that their work would get all the attention paid to it that might be necessary to have done to insure its good performance; does all of our best workmen at all times that which they know is necessary before they let the job leave the shop, and guarantee that the next hands it falls into will not be able to discover with that jealous eye something that the first hand could have been better in some way; or is it an established fact that all of our best workmen never slight any of their work? My impression is, you will admit it at once, that they do. Admitting this then to be the case—if all the botches are dispensed with, who would you have

to blame with all this poor work, and how long would it be until our customers would think that the superintendent had been bribed, and diplomats illegally obtained, for their watches had been botched again, for the last man I took it to be to be repaired said it had been botched. Every trade has its advantages and disadvantages, and I feel certain if there was such a society it would not secure the trade against botched work, or the customer work from being botched. I am well aware of the annoyance that is felt by the trade by this class of workmen, and I am free to confess I can't see how they are to be outlived, or the public to be released from such impositions. For example: a customer hands you a watch to be examined; you may see it needs a good deal of repair in order for you to warrant it—as the customer may ask if it you—the pallet is out of position; leverwork been hit and filed, and may be banking changed, you say to the customer, it will cost \$4 or \$5 to put it in good running order; the customer may say that Mr. So-and-so said it would put it in good order and warrant it for \$2.50; you will say, I can't do it for that and insure satisfaction. The customer thinks and says, "I'll just wait, although you have a good reputation as a workman," but he takes it to the cheap workman, who is a man that the people say is a very competent man for his work at watches, guns, and, may be, blacksmithing. This man cleans the watch, puts on fresh oil, and if it don't go to his liking he will put it on a second-hand watch that he had ever since the door, that is stiff enough to bend every tooth in the train. The owner comes and takes it out and says, "It's just as it is all right now, is it?" Yes, is the reply; it runs badly now, but I had a hard time to get it to work, as the gig-wheel was valuable of work, and the horizontal high, and to be adjusted; but I put a spring in that brought it to time, and now she is all right. It is but natural to suppose that a watch in such a condition would go hopping along, if at all, some times fast and sometimes slow; and then he tells others that Mr. A. fixed his watch and only charged \$2.50, and that other fellow's watch was just as it runs, just as well as if he had fixed it, and I believe he went to cheat me out of that \$2.50—and if I have any more work to do I will take it to him for he is cheapest. Now, gentlemen do you think that such a society would make any difference with such men, for I feel certain that nothing of that kind will do away with botches, or make it any better for the trade; but as an old maxim says, pluck the mote out of your own eye and then you can see to pluck those out of your neighbors. It seems to me that it is a professional epidemic for watchmakers to call each other bad names to their customers, and the consequence is they do not know who to believe or trust. They hear them all running each other down, and calling them botches, and so what right have we to expect anything but botches and bad work, and rascals. In many cases our best workmen slight their work, which looks more ridiculous to me than if done by a professional watchmaker for the hour from a bad he knows how, but a good workman has no excuse for slighting his work; and if he does, he is the worst man of the two, for he betrays his customers and brings a curse on his profession. You may suppose from the reading of this, so far, that I am constitutionally opposed to a watchmakers society, and for ten or fifteen years I give you my views on that part of the subject, and shall hope to see the day when there will be a good society of this kind, that will prove advantageous to the trade and also to the public, for both needs protection not only from botches but also from unprincipled tunc. My plan is, and has been all through life, if I could not speak with confidence's work, and felt I was doing right to others, I never say anything to injure him; and if they insist on taking it to a cheap workman, I say to them, Well, if he don't give you satisfaction you can bring it then, and I will do the best I can for you, but I can't work under regular prices. It is necessary that all societies should have a constitution of laws, that the society may



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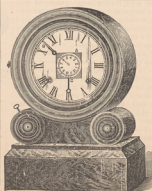
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think the best for its adoption, and such that are practicable and most needed in that society, and I think that the society ought to regulate the price of work for all kinds of work in that State, and that every workman that joins the society shall be bound by an oath to live strictly up to such laws as the society may see proper to adopt; and that there should be no laws nor regulations made only by vote by the members of the society. I am favorable to this society admitting botches if they choose to join, and there should be a series of lectures on clock and watch repairing, clock and watch making, and where questions can be discussed by our best authority, and by so doing be a general benefit to all. Then speak well of your profession, and I feel certain there will be a change in affairs. The customer will see for himself who is the cheapest—the botch or the practical workman, and he will be left to think for himself, and it will make no difference who done the poor work, they will soon be detected by them. The public will form a better opinion of the trade's honesty, because they are not accusing each other of being botches, and the result will be, the botch did to accomplish to assist the ladder or fame as a practical workman, or he will be left in the shade. What do you think of this, gentlemen?—Is it too hard a task on our profession to stand or would it be better to begin more moderate, and draw the reins of reform gradually tighter and tighter—and now I will leave it to your own deliberation, and I hope that it is amended in all its weak points, for I feel as though there must be room in it that I have failed to see, and room for more thought than I have gave it. With all due respect,

I remain your truly, &c.,

ISA D. STOCKING.

ORANGE, Ball Co., Mo.

Going Barrel Co. Fuzee Watches.

To the Members of the Horological Club:

Allow me, through you, to thank Mr. Fritz for setting me right before the club. Not being skilled with the pen, I am sure it did not express myself as clearly as I should. His letter states my position very clearly, but I will pardon me for adding a few words more.

I do not claim that going-barrel watches will perform better than fuzee watches, but I say if a watch can perform just as well without the fuzee and chain as with them, we ought not to bother with them at all. I go further, and assert that it can; and I leave it to any watchmaker who handles and sells the best grades of American watches if they do not perform as well in every respect as any fuzee watches ever imported. My experience has been chiefly with the finest Waltham and Howard movements, but other workmen may have found other makes as good. The question narrows itself down to this: Is the American system a failure, or not? If fine American watches are just as good as fine fuzee watches, then the former should be preferred on account of their simplicity and their many excellent mechanical points, to say nothing about economy in our home industries and the saving in cost. Every working watchmaker must assent to that.

No one who has read Mr. Fritz's articles on adjusting the compensation-balance, and the effects of heat on the hair-spring, can doubt that he is a good authority; and he agrees with me, in his letter, as to the unequalled performance of fine American watches. So do Mr. Waltham and others of the club, and so, I venture to say, do a large share of practical workmen. But Mr. McFuzee thinks that no one would venture to run a going-barrel watch in competition with a fine fuzee watch. What do our American Watch Companies say to that? Are they ready to own up the corn and take down their signs? What have American watchmakers all over the country got to say to that? They certainly know whether the imported fuzee watches perform any better than our best American movements, in actual use. How is it, gentlemen? I mean no disrespect to Mr. McFuzee, for I am aware that a great many of the best workmen share his opinions. They have been

brought up in that belief, and it is hard for them to see anything different. The issue is between old-fashioned, orthodox notions and more modern ideas. Which are correct? I should like to see this question settled while we are about it.

INQUIRE.

Communications.

Trade Societies.

Editor Jewelers' Circular:

Noticing an article in the June number of the *Journal*, under the above caption, in which my name appears, I thought I would drop you a few lines on this subject. No one realizes the importance of organizing Horological Clubs or Societies in this country more fully than I do. But how to bring about this most desirable and important object is the question.

I have not only expressed myself through the columns of your most valuable *Journal*, but have written to several members of the craft in this State, only two or three of whom seemed to think of sufficient importance to be willing to agree to try and organize a "Pioneer" Society. I feel that it must be useless to attempt to do anything with less than ten or fifteen; with that number of good, energetic members of the trade as a nucleus, I am certain that we could not only have, within a year or so, a flourishing society, whose influence would be felt throughout the State, but in our sister States also; and you would soon have the pleasure of recording the proceedings of similar societies throughout the whole Union. But I have despaired of getting up anything of this kind in this State until after some one of the more populous States take the lead. New York city, or its watchmakers, would do us a good turn if they would take the initial step.

Mr. Boss's idea of holding monthly meetings would be an impracticable one of large cities, as it would consume too much time and money for those who had any considerable distance to travel. After society so organized, and well established, one or two meetings a year would be sufficient for practical purposes. Of course in large cities, where they could have local societies, monthly meetings would be advisable.

I would suggest that some one or more watchmakers in each State, who feels the importance of getting up these societies, request, through the columns of your and other trade journals, all those who are willing (and *know* themselves to be *fair* workmen) to join a society of this kind; to address them by this means we might find out all who are *anxious* to set this ball in motion.

I would say to my brethren of this State (Georgia) that I will be glad to hear from them; and will, through the columns of this paper—say in the September number—let you know how many have signified their willingness to become members of a Horological Club.

JAS. FRICKER.

AMERICA, GA.

NICKEL PLATING is now very extensively carried on for the covering of articles hitherto plated with silver. Nickel is very easily deposited, and may be prepared for this purpose by dissolving it in nitric acid, then adding cyanide of potassium to precipitate the metal; after which the precipitate is washed and dissolved by the action of a weak cyanide of potassium. Or the nitrate solution may be precipitated by carbonate of potash; this should be well washed, and then dissolved in cyanide of potassium. A moderate quantity of potash will be in the solution, which is not found to be detrimental. The sulphate of nickel is also a soluble salt, and the metal is reduced more readily from it than from the nitrate. It is preferable to use the solution as strong as possible. Nickel forms a compound with the cyanide of potassium on boiling the oxide in a solution of that salt, which takes up a considerable quantity. The acetate of nickel is easily formed, by adding pyrophosphoric acid to the oxide of nickel, but it is a bad material for obtaining reguline or pure metal. The chloride of nickel is formed by dissolving the metal in muriatic acid.

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SPECIAL NOTICE.—We take pleasure in announcing that we have removed our office in this City to the Store No. 552 Broadway, (next door to the Meriden Britannia Company,) where we shall be enabled more fully to display our stock of WATCHES and CLOCKS. We shall keep in stock a full line of our Fine Clocks, including our TOWER CLOCKS, and shall be pleased to show the latest improvements in them. Yours respectfully,

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H. HOWARD.

A young lady fashion writer for the daily press has perturbed the hearts of several of our hatcher friends in the Lane. She is in the habit of visiting that locality in search of news, and on such occasions displays on her starboard breast a silver badge with the words "Press" engraved thereon. And yet the boys are so modest to accept the invitation! Cable says he would have been a better man in their place.

Our friend Joe Atchison went to Boston to witness the Banker Hill celebration. While strolling along Washington st., he met an old acquaintance, who saluted him with "Halloo, Joe, old fellow, I am real glad to see you,—how fat you're getting! What did you weigh last time? Well, now, I really have forgotten," retorted Atchison, "but as near as I can remember, it was 200 pennyweight of Swivels for some fellow in Chicago!" They both went to Parker's and drank ice water.

We have to welcome a new-comer from across the sea. The *Watchmaker, Jeweler and Silversmith*, a monthly journal devoted to the interests of the trades in Great Britain. The first number is that for June; it has much entertaining reading matter, although a large proportion is of general rather than technical character, and two pages of illustrations. It is of 24 pages, about the size of the *Notion*, and is published from 8 Cross Street, Hatton Garden, London, at 5s. the year.

A British Watchmaker's Picture of America.

[A despairing brother in the trade, writes from a neighboring city, to the *Pull Mail Gazette*, on the sad state of things in his adopted country. It is so thoroughly run down, according to this orthographical brigade, that it's no use to attempt to repair it. It might be suggested to him, however, that there is one thing in this country which is a first-rate institution, viz.,—the spelling match. But, perhaps, he owes us a grudge on this very ground.]

To the Editor of the *Pull Mail Gazette*:

Sir:—I hand you a copy of *The Iron Era* in which on the 3 page you will see the Speech of a Professor B. G. Northrop on the Progress of the Education in England as one of the Insults to the British Nation that we hear daily. The learned Professor refers to the Education of America that opened the Port of China and Japan. Can this be true? That one Half of England was owned by 149 Persons & Scotland by 12 (Twenty) men. That the People of England lived on Black Bread & Scum milk cheese (all this true). That there were 300,000 Paupers in England (all this true). And 40,000,000 Dollars were Expended for there support annually. I would say at this Present Time in the State of Pennsylvania there are thousands that do not have as well as those who Present Spoken of. And with all the resources of nature the have not Gold nor Silver Currency. As to the Education of America, it is well enough in the evening and Sunday Schools even at 10 years of age. But Mathematics and Natural Philosophy they are ignorant of. The Education of letters in this country is nothing unknown. We hear the most outrageous Tales of England Progress, and it is a settled fact that England is a Poor Insufficient nation and able to cope with the Smaller Powers, and the small business men of the land about 20 miles away find a mob for Serins. England is used as a By word and an English man has no Show in this Country, as you stand Firm. Myself I have been with Chinese Spaniards Italians Portuguese Russians French & many others speak 4 Tongues, and in all my life with my Experiences I never met with a People so void of Education as the English. I have got Every Thing done Every Thing & Every Body. Knows all & no one Else knows any Thing. I have been here 7 years have business of my own as Watch Maker & I am from England. If I had an Education I could write a volume on America. The have a Plenty of so called Institutions but no Realities. The Pound Keeper creeps after Constable & do his work, the Constable after the Squire with His uncleaned Hair and unwashed Face he looks A better fit Subject for a Lunatic asylum than a Judge of Peace, & so the groups after one the other up to the President. To give you an Idea how it is in a small Town, the Constable asked the Squire to change a Five Dollar Bill, when the Squire presents his Pocket Book to give the Constable the said Squire were the Hell you get all that Money from you Gori Dugoli old Second. Squire said Hell on you well you are a scoundrel. It is the only to meet not Justice that America Best of. The Sons of America are all scoundrels and not then for the Mineral & Vegetable With the Go Zinkrup, These few remarks I close. Please to Excuse My English. I remain yours Sincerely W. H.

Trade Cossip.

Turquoise Jewelry is again popular. The small earrings are giving place to medium size pendants.

A Brooklyn watchmaker claims to have cleaned 5,844 watches within the past year.

Toronto Shell Jewelry is exceedingly fashionable, and greatly sought after by the elite.

The Broadway goldsmiths are making it lively for the vendors of cheap and cheap jewelry.

The second best thing to encircle a lady's waist now-a-days is a belt with a silver buckle.

Too many sales "on time" have necessitated the closure of several Connecticut clock manufacturers.

Switzerland proposes to "watch" our Centennial. Just *see* alone, and she'll come out all right yet.

The diamonds of MacMahon the fugitive have been surrendered by the Custom House authorities to the Bank of England.

"No, ma'am," said a Jeweler to a beautiful lady, "I don't trust anybody those days. I would not even trust my feelings."

Jaquet Droz are receiving extensive invoices of watches. Their goods have become exceedingly popular in this country.

Messrs. Morgan and Healdy, the well-known manufacturing jewelers of Philadelphia, have opened a branch house at No. 21 John Street, New York.

The jewelry store of A. McKenzie, at Barrie, Canada, was destroyed by fire on the 18th June. Most of J. H. McKenzie's, of the same place, insurance not known.

Most of the twenty-cent pieces coined by the San Francisco Mint have gone into the hands of the brokers, who retail them to the public at the very low price of 20 cents each.

The Pope has sent the Shah a Florentine mosaic table and a bronze model of the triumphal arch of Septimius Severus, at Rome. The presents will be delivered by the Archbishop of Braccio.

Messrs. Chas. E. Spencer & Co., gold and silver refiners and assayers, of 147 Mulberry street, are doing a thriving business. Jewellers and silversmiths who desire their services would do well to communicate with them.

Mr. Richard Oliver has not only won the abiding esteem of a large circle of friends, but a very handsome gold watch, which was awarded him for his progress in a recent watchwork race. He has now almost as many decorations as MacMahon.

Messrs. Pfleiderer, Dreyfus & Keller, Importers of watches and jewelry, and manufacturers of the celebrated Patent Revolving Lavishable Centre are now producing races in gold and silver with two joints instead of one, as seen in the advertisement.

Messrs. Howard & Co. have on view a very handsome gold watch and chain presented by the passengers of the steamship *Prinze*, to her commander, Capt. E. Balchmann. The movement is of Waltham manufacture and the case, a marvel of artistic beauty, and one of the best efforts of that celebrated company.

The Summer Regatta.

Mr. Hawkins and daughter are in Paris.

Mr. Wilcox, of Conroversal, Wilcox & Co., will pass the summer at Saratoga.

Mr. Peterson, of Baldwin, Saxton & Peterson, is travelling on the Continent.

Mr. C. C. Adams calls for Europe on the 2nd instant in the steamer *Britannia*.

Mr. David Decker, who last year won an enjoyment in the English Regatta.

Mr. Duranoe, of Smith, Duranoe & Edges, will pass the summer at Long Beach.

Mr. A. Bernhardt, of A. Bernhardt & Co., diamond merchants, sailed for Europe on the 2nd inst.

Mr. C. Buckley, of the Waltham Manufacturing Co., is spending a few weeks in North Granville, N. Y.

Mr. John E. Shepard, of A. M. Hays & Co., is Europe in search of novelties for the Fall trade.

Mr. W. W. Stewart, of Alkon, Lambert & Co., will spend his vacation with his friends at Niantic, Conn.

Mr. Reynolds, of the firm of Cole & Reynolds, will pass the summer at his charming villa, Washington Heights.

Mr. Le Boutillier, of Le Boutillier & Bride, importers of London, Paris, and Vienna fancy goods, is in Paris selecting goods for the fall.

Mr. A. Schuch, of the firm of Schuch Bros. & Co., general agents for the International Watch Co., is in Schaffhausen arranging for a larger supply of goods.

Mr. Cross, of Messrs. Cross & Bequelin, and family, are spending a short time with friends in Sumnerville, N. Y. They contemplate spending August at Saratoga and White Mountain.

Mr. Fitch, of Robbins & Appleton, and A. K. Sloane, of Fitch, Hawkins & Sloane, have been to the New Hampshire, and the trout were tickled to death to be caught by them.

Le Boutillier & Bride, IMPORTERS, 10 Maiden Lane, N. Y.

We have just received another large invoice of

LOW-PRICED FRENCH CLOCKS!

BRONZES! MUSICAL BOXES!

And FANCY GOODS!

Which have been personally selected from the manufacturers, with the intention of making our assortment and prices suit the requirements of all.

We invite the attention of the TRADE before purchasing.

FORMERLY

Shepard, Le Boutillier & Co.

CRYSTAL CHANDELIERS

GILT, BRONZE & DECORATED GAS FIXTURES,

Fine Marble & Bronze

CLOCKS,

Bronze Figures and Ornaments in Greatest Variety, at Low Prices, Manufactured by

Mitchell, Vance & Co.

No. 597 BROADWAY NEW YORK.

"Medal of Special Award" by American Institute, 1872,

No. 719, GAS FIXTURES.

MITCHELL, VANCE & CO., 597 Broadway, N. Y.:

"We find the above-named Fixtures and Glass Chandeliers, for design, excellence of workmanship and finish in all their parts, to be the best production in the country and we may say, in our judgment, excelled by no other country in the world."

"We received a MEDAL OF SPECIAL AWARD for CHANDELIERS and GAS FIXTURES."
(Signed) JOHN W. CHAMBERS, Secretary.

"A Medal of Special Award confirmed."

C. F. A. HINRICHS,

20, 31 and 33 PARK PLACE,

COR OF CHURCH STREET, (Upstairs) NEW YORK

Successor to M. WERCKMEISTER.

(ESTABLISHED 1861.)

IMPORTER AND DEALER IN FANCY GOODS.

Glass Ware, China, Bronzes, Clocks, Toys, &c.

Sole Agents for the GLASS FACTORIES of the COMPANY "ANIS," Namurize, Belgium

Depot for ARCHOERY, ORICKET and BASE BALL IMPLEMENTS

And for C. A. KLEMMANN'S CELEBRATED GERMAN STUDY LAMPS.

Agents for BOEGER'S GROUPS in Paris, &c.

Price Lists sent on application.

Goods imported to order.

PROCEEDINGS OF THE HOROLOGICAL CLUB.

A Distinguished Body of Watch and Clock Makers.

Twenty-first Discussion Communicated by the Secretary.

On this occasion, the argument between the advocates of the going-barrel and the fusee was continued. Several communications on the subject were received from different parts of the country which had the effect of comforting, strengthening, and renewing the courage of both parties. A paper on the subject by Mr. J. J. Muma was handed to them by the proprietor of their official Journal, but as this communication was not addressed to their honorable body it was considered that a discussion of its contents by them might possibly not be desired by Mr. Muma. There could be no breach of confidence, however, in stating that in addition to the well-known opinions Mr. Muma has expressed on this subject in the past, he now asserts that the use of a fusee nearly doubles the force of the main-spring per same number turns of spring. It was generally considered that if Mr. Muma would concede to address their honorable body, and prove this point, that hostilities between the Fusees and Anti-Fusees would be settled by a complete annihilation of the Anti-Fusee party.

Mr. Gordon's communication printed in the correspondence column, was then read and was well received by the Fusees. Several new points in the discussion were brought up by this communication which could not be contradicted by any Anti-Fusee present.

Their worthy member "Geneva" although absent in the body, was with them in spirit, and proved himself to be the worst kind of an Anti-Fusee. His paper was reconsidered by his party, in fact by unanimously considered to be a very able production.

Mr. McFuzze then rose and said that "Geneva" had commenced his paper by expressing the hope that he would not be considered ungenerous in stating that the ready date-stricken enemy. He in turn would express the same hope that "Geneva" would not consider him ungenerous in striking or opposing his opinions to absent friend. It was a fact that "Geneva" was absent, but it was not a fact that the fusee was either dead or death stricken.

According to "Geneva's" style of reasoning, the equal transmission of the force of the main-spring and all the beneficial results which consequently follow, were entirely, absolutely, and altogether unnecessary in a modern watch. On the same grounds he might assert that fine-tooth wheels, high-numbered pinions, and smooth running depths, good oil, &c., were superfluous in modern watch-work, because the frictionism of the balance would correct all irregularities in the train, if the wheels only kept moving. Too this, friend "Geneva," the isochronous properties of the balance-spring is limited, while the isochronism, and this valuable property should be taxed no more than necessary.

As regards the Neuchâtel trials he did not consider that they proved much. They had no evidence that the fusee and going-barrel watches which were under competition at these trials, were the same in every respect. The period of trial was, in his opinion, too short, because it was principally in long trials that the fusee showed its superiority.

The communication from "Inquirer," who was the author of all this agony on the fusee and going-barrel question, was then considered.

Mr. O'Leary said that a full settlement of this question was what he also desired, but he felt like sitting on the rugged edge of despair when he tried to devise a plan by which so desirable a result could be obtained. He once thought of the "Neuchâtel" trials, but he felt that if he were to be selected, and the true inwardness of both sides of the question laid before them, but after due consideration he was afraid that this plan might not produce the desired re-

sult. In the first place, it was necessary that the very men who were to decide the question should know nothing about it; and again, there was danger of a repetition of the old story of the nine stiborn and thick-headed jurymen standing out against three sensible ones. He thought this fusee question was one which every individual ought to decide for himself.

Removing Magnetism from Steel.

To the members of the Horological Club.

In a practical article we cannot enter into a philosophical disquisition on theory, or evidences of the truth in support of the theory (to any extent) from which we deduce the practical question was one which every individual ought to decide for himself. The position assumed is, that magnetism is motion—the force of motion. Its origin, the earth's planetary motion relatively considered—the earth's different positions in the ecliptic—the equinoxes, the solstices, the changes of temperature, etc., all bring us terrestrial objects into contact with the terrestrial poles, but the needle at different terrestrial points showing different degrees of declination (variations of the north), and the Earth's rotation on its axis, westward, we are led to conclude that this current of motion is not indebted to the present polar star (which was not formerly known), but is due to the force of an "imponderable fluid," so called, philosophically, but dependent upon causes subject to changes not entirely unlike those of the Tides. We have four inches of steel bar half inch square by four or five inches long, magnetize it; then lay a piece of stiff paper on it, and sprinkle evenly on the paper a quantity of iron filings, and the particles will arrange themselves in the forms in which the current moves, coinciding approximately with the terrestrial currents as indicated by the dipping needle, magnetic declination, etc. These currents we believe to be little eddies of motion formed by the great sea of motion from the *use of a fusee*. We simulate the current of the eddy by the *same law*; and by this *law* put into practice, the current is forced from its lodgment to flow on with its captor.

Now we have a piece any magnet of more power than is contained in the thing to be "unmagnetized," place upon a table or glass surface the thing to be operated upon; hold it, or rather let it move, so that the magnet will not move it; then lay the magnet, with the poles facing, on a straight line with that of the piece to be operated on, and three or four inches to the right of it, so it will pass to the left on a straight line within a quarter of an inch, but *not* touch. Pass the magnet at this distance *slowly* (a little faster than a snail would crawl) till it is past the article four or five inches on the other side. Now turn the magnet over, and repeat the operation. The magnet is now a piece in the article operated on, to the article over or around, in order to reach the diverging currents, as shown in the experiment of the falling over the magnet not referred to above.

I write this communication hurriedly as I am anxious that it should reach New York in time for the July meeting of your honorable body. The subject is so exceedingly simple, it might be laughed at, yet if the experiment is properly performed, success is inevitable. Pass the magnet over the article to be demagnetized, and then the article to be demagnetized, and in the manner shown in the diagram. A B F is the piece of steel to be demagnetized. I is the magnet; i is the dot line C is the starting, and the dotted line E the ending point of the motion of the magnet when passed horizontally over the piece of steel under process of demagnetizing. The first operation is not successful, try again. To take the magnetism out of a watch when it is to be reformed, perform the operation by turning the watch round for several times, and also turn the magnet round for the purpose indicated in the above communication.

A. B. F.

MILLERSBURG, Ohio.

Mr. Horologer then rose and said that according to his opinion the method of removing magnetism from steel described by their correspondent, in reality effected but little, if any, from the plan given by Mr. Seconds Hand and their May meeting. At an afternoon session devoted by both methods were the same, but he contended that in no instance was the magnetism removed from the steel, although its effects might be neutralized in some cases. He was then asked by A. B. F., that small quantities of magnetism might be swallowed up by greater quantities he believed to be fallacious. The reverse was his opinion, that a small amount of magnetism would impart its properties to an unmagnetized steel or iron body when brought into close proximity to it. Nothing could possibly prevent this result, and the smaller the body was the more thoroughly it would be charged with magnetism. The needles in the ordinary mariners' and surveyors' compasses were charged with magnetism in the same way as A. B. F. proposed to remove the magnetism from pieces of steel. He was still of opinion that the method described by their correspondent Mr. A. B. F. had simply reversed the polarity of the steel pieces they supposed they had removed the magnetism from. It was universally known that, while the different poles of magnets attract each other, similar poles always repelled each other, and the polarity being changed, the small steel pieces in question, the effects of the magnetism in them, in some instances, became harmless or comparatively so.

The chairman, while not pretending to be any great authority on this subject himself, expressed his opinion that Mr. Horologer was going too far when he attempted to contradict the experience of two gentlemen who had evidently given the subject some serious consideration.

Mr. Horologer again rose and said that he was not relative to the correctness and reliability of his statements on the question. He had given the subject of magnetism a great deal of attention, as a portion of his business, and for many years he quired him to study magnetism. He was prepared to give a practical demonstration of what he had asserted on the subject, and was willing to do so, and was very agreeable to their honorable body. All the members present were eager for the practical demonstration to proceed at once, and were willing to sit all night if necessary to do so. Mr. Horologer then called on some one to volunteer to go up to his place of business and bring down the necessary instrument and Mr. Secresquewer at once responded. Mr. Horologer then instructed him that a number of his workmen were working late, and he would have but little difficulty in getting in, but if he could not make himself heard he might gently force the door at the foot of the stairs and go right up and ask his foreman for the last steel magnet in the shop, and the compass which was in a box on the shelf over his desk in the office. He was to keep the compass and the magnet as near as possible, and if he could, as the compass was a very delicate and accurate one. He was also to bring some pieces of steel of various sizes and lengths, which the foreman would give him if he told him what they were to be used for,—and above all he was not to forget to ask for some steel filings. Mr. Secresquewer then started on his journey with the knowledge of the importance of his mission, and a short half hour took place in the deliberations of their honorable body.

Mr. Seconds Hand took occasion to remark, that with every communication received to the communication received from their correspondent, H. B. F., and the theory which it contained; that he knew from practical experience that by using a small quantity of magnetism to remove the watch so that it would run. If H. B. F., however, had a better way of doing it than he described at their May meeting, or if he could show the same results without touching the watch, or taking it to pieces, that was exactly what they all wanted to know, more particularly about, and then old Seconds Hand would not consider his

statements on the subject were for naught. No one liked opposition better than he did, for that was way he got at the facts, and learned the best, and most practical methods of accomplishing our work.

PURSUIT OF SCIENCE UNDER DIFFICULTIES.

A considerable time had elapsed since Mr. Secresquewer had left to bring the instruments, and advice, and the removal of him returning. The members could not fix their attention on any other business, and they became more and more restless and impatient. The chairman, however, persisted on magnetism. At length a noise was heard on the stair and Mr. Secresquewer appeared without the instruments, looking pale and excited, and closely squeezed between two policemen. Noticing could picture the look of dismay which immediately appeared on every countenance. The chairman demanded of the stalwart guardians of the night what was the cause of their unexpected presence. A stalwart guardian replied by asking if he had the honor of addressing the Horological Club. The chairman replied that they were not a body of Horologicalists; they were Horologists.—His-or-o-log-ists-sir; every man present can tell that. The chairman then said, "Oh, a mere evasion, responded the stalwart guardian,—never heard of your society before. We caught our prisoner in the act of breaking open the door of a watchmaker's workshop, and he pleaded as an excuse that he was acting in the interest of science and knowledge, and according to the instructions of his club. Gentlemen, replied the S. G. of the night, this appears to be a very suspicious case. It is my duty to request you all to accompany me to the police station at once."

At this juncture Mr. Horologer, with great promptitude and presence of mind, explained that all they had said was perfectly true, but the door that their honorable body had broken open was not the door, and was done in obedience to his own instructions. He invited them to examine the record of the proceedings, which covered a period of many years, and to cover a period, engaged in educating the watchmakers of the world, and that too without fee or reward of any kind except the satisfaction of doing good. The S. G. of the night very specially directed that another police officer had been committed and with profuse apologies prepared to depart.

The Chairman while accepting their apologies took occasion to administer a most scathing rebuke. He told them that their offences were of the most heinous nature. They had no previous knowledge of the existence of their Club. They had termed them a body of Horologicalists. They had insulted Mr. Secresquewer who was their main support at the time the outrage was committed, and last and worst they had obstructed the course of science. S. G.'s of the night, he continued, "I am glad to hear that you are all so happy to get struck by lightning and your watches become magnetized; you will then understand the value of science and the gas and the magnet are not have a pay five dollars for *quitting* their watch."

This unexpected termination to their magnetic experiment completely upset the chairman, and he moved the meeting immediately voted to adjourn. Of course it pained them to leave so much business unfinished, and the pain was increased by the joyful news that the hearts that would be when they heard they had to wait another month for the consideration of the particular subject they expected.

The chairman requested the members to be punctually in their places at the next meeting, as many interesting and vexed questions would be submitted to them for discussion. The numerous communications unavoidably laid on the table would be first disposed of, when new business of importance would be taken up. He understood that the successful research of the members of the horological club abroad, and had awakened considerable interest, and he trusted that this little episode in their experience would not permit their zeal to languish.

THE AMERICAN WATCH COMPANY OF WALTHAM.

Stem Winding Movements.

The universal success of the several grades of Stem Winding Movements produced at this establishment has authorized the Company to extend their facilities and increase the production of this class of goods. They have thus been enabled to keep up their force of workmen, while other factories have been obliged to discharge a large proportion of their employees. The growing demand for Stem Winders is such that it is believed that a watch with a separate key will ere long be shown only as a curious relic of the past.

THE INCREASED PRODUCTION ENABLES THE AMERICAN WATCH COMPANY to reduce the price of their movements considerably and thus to bring them within the means of all.

Silver Cases.

TRADE



MARK.

The American Watch Company continues to hold the lead in the manufacture of Silver Cases, notwithstanding the great competition. These are made in the same factory with the movements. Their success is due to the simple facts that they fit the movements accurately, and that their quality is absolutely maintained up to the standard of American coin.

This can always be relied upon, and purchasers desiring this security should require the stamp of the American Watch Company. It is notorious that the majority of other Silver Cases are alloyed from 5 to 10 per cent. The Company have lately made arrangements to increase their supply of Silver Cases to meet the growing demand for reliable goods that will stand the tests for quality and will not stop the movements.

Gold Cases.

The success of the new Gold Cases of the Company is even more encouraging, and notwithstanding the dull times the production of their shop is greater than ever before. This, they believe, is because they are known to make every case PLUMP as stamped, a special certificate of quality accompanying each case on the legal guarantee of the Company. They maintain also the standard of workmanship, and do not follow the frequent plan of requiring their Cases to be made as cheap as possible, without regard to the character of work. The same is true of the decoration of these cases. They direct their workmen and engravers to make and finish these Cases AS WELL AS IT CAN BE DONE, and the result is a GOOD CASE and a HANDSOME CASE. These Cases consequently wear well, and please the purchaser, who exhibits his watch with pride, while they cost but little more than the poorly made and ugly cases, of doubtful quality of gold, with which the market is flooded.

THE BRYANT TESTIMONIAL.

Few lives have been lived in America, or in any country, more worthy to be held in everlasting remembrance than that of William Cullen Bryant. The poet who wrote "Thanatopsis" in his youth has seen nearly three generations go down into the grave with the comfort of his reconciling words, and is still among us, the years yet full for him of the fruitage of good works. Indeed the coming years must always be the richer for the abiding influence of the poems and life of one who is recognized by most as the greatest of American poets and who has been always one of the most typical and exemplary of American citizens. Such a life is in one sense its own best monument, yet it is fitting that the gratitude of a community for such a good should be voiced in some permanent memorial, which should testify

It was decided that the memorial should take the somewhat novel, but fitting, form of a commemorative vase, in solid silver of the best American art-manufacture. A design had already been prepared at the suggestion of Dr. Osgood, by Tiffany & Co., but the committee of twenty-five appointed from the Century Club, among whom were, besides the originator of the idea as Chairman, Dr. Bellows, Dr. Potter, Wm. H. Appleton, John Taylor Johnston, B. H. Field, Jos. H. Choate, and as well-known citizens, proposed to open the award to competition and invited other silversmiths to submit designs. The conditions were that the vase should be of solid silver, thirty inches high, and cost \$5000.

This left a wide range of design to the artist, who indeed could scarcely



Accepted Vase, designed by Tiffany & Co.

at once to the greatness and fullness of the life and the honor with which it was regarded by the generations among which it was lived.

It was a happy thought of Rev. Dr. Samuel Osgood that the eightieth birthday of Mr. Bryant should be celebrated by the provision of some such memorial, and it is to his suggestion and the eager co-operation of other members of the Century Club, of which Mr. Bryant is the President, that we owe "the Bryant Vase." The vase is to be presented to him, but after his death it is to be placed in the Metropolitan Museum of Art, the art-treasury of our city and the proper abiding-place of an art-monument bearing the foremost name recorded in its annals.

He had also been among our leading philanthropists and reformers, and bore a prominent part in that most inspiring of triumphs, the freeing of a race. In fact, he has been identified alike with our literature and our history. The absolute purity of his life as a citizen and a man would alone have entitled him to veneration. He was at once the interpreter of Nature and the ministrant of Art. Classic in the simplicity of his thought

and diction, he was thoroughly a modern in his appreciations and sympathies; his translations of Homer, the finest the world has produced, linked the early age to our latter days. What richness of possibility thus opened to the designer in the choice of thought and the use of emblems! His life and his poems were so full of opportunities that the main difficulty was an *embarras de richesse*.

Five designs were submitted to the gentlemen having the control in the matter. They were designed and submitted respectively by Mr. Jas. H. Whitehouse, Tiffany & Co.; Mr. T. J. Palpout, Gorham Silver Company; Mr. Chas. Osborne, Whiting Manufacturing Co.; Mr. C. Witteck, who designed those submitted both by Starr & Marcus, and Black, Starr & Frost. All found admirers, but those which met with most favor were the three first named, of which we give engravings, through the courtesy of the Messrs. Appleton, in whose admirable *Art Journal* (American edition) they appeared. Excellent cuts of all five were given in a recent number of the *Journal*, the only criticism to be passed upon the engravings being that, since each vase was reduced to the same size block, by different standards, the cuts fail to give an adequate idea of their relative importance. The Gorham vase, it should be noted, is the especial sufferer from this cause, while the Tiffany vase gains relatively in the engraving.

The accepted vase, after the Tiffany design, is of Greek form, with open top, the body being of the shape of an egg, and is thirty inches in height. It is to be executed in oxidized silver. The chief feature of this vase is the simplicity of its general design. Most of the decoration is in sufficiently low relief to preserve unity of outline, and this effect is perhaps the best point in the successful design. On the other hand there is less poetry, invention and freedom, we may say less inspiration than in any of the others. It seems as though the designer had not made the most of the opportunities of his subject, although such decoration as he has used displays true artistic skill in the adaptation of American plant forms for decorative purposes and a happy use of the symbolism of plants. The patterns he has designed entirely cover the surface of the vase, and, setting aside the question of artist inspiration, are the work of a thoroughly skilled designer. As a piece of futile design, the preference is certainly to be given to the Tiffany vase, which is noble, massive and rich, but as an example of higher art, it is surpassed, we think, by both the others here illustrated. And the use of a noble metal should permit much more freedom than is possible in the ordinary material of vases.

The zone of the vase is occupied by a belt of six medallions, the front one being an admirable portrait of Mr. Bryant's noble head, crowned by the classic wreath. Above this medallion is the lyre of the poet, below the primitive printing press, recalling his journalistic career. The other medallions follow the story of his life with scenes wrought in low relief. One shows his father pointing him to his career:—

For he is in the grave who taught my youth
The cut of verse, and in the bud of life
Offered me to the muses.

Another represents the poet musing in the wood. —

Stranger, if thou hast learned a truth which needs
No school of long experience, that the world
Is full of guilt and misery, and hast seen
Enough of all its sorrows, crimes, and cares,
To tire thee of it, enter this wild wood
And view the haunts of Nature. The calm shade
Shall bring a kindred calm, and the sweet breeze
That makes the green leaves dance, shall waft a balm
To thy sick heart. Then wilt find nothing here
Of all that pained thee in the haunts of men,
And made thee loathe thy life.

Another shows the editor at his work, and another the translator interpreting Homer to these later days. Directly under the portrait medallion is a smaller circle, in which the "water-fowl" is seen winging its way across the sky:—

Whither, midst falling dew,
While glow the heavens with the last steps of day
Far, through their rosy depths, dost thou pursue
Thy solitary way?

Vainly the fowler's eye
Might mark thy distant flight to do thee wrong,
As, darkly limned upon the crimson sky,
Thy figure floats along.

Seek'st thou the plashy brink
Of weedy lake, or marge of river wide,
Or where the rocking billows rise and sink
On the chafed ocean side?

There is a Power whose care
Teaches the way along that pathless coast,—
The desert and illimitable air,
Lone wandering, but not lost.

An oval medallion on the neck of the vase shows "The Fringed Gentian":

Thou blossom bright with autumn dew,
And colored with the heaven's own blue,
That openest when the quiet light
Succeeds the keen and frosty night.

Thou comest not when violets lean
O'er wandering brooks and springs unseen.
Or columbines, in purple dressed,
Nod o'er the ground-bird's hidden nest.

Thou waitest late and com'st alone,
When woods are bare and birds are flown.
And frosts and shortening days portend
The aged year is near his end.

Then doth thy sweet and quiet eye
Look through its fringes to the sky,
Blue—blue—as if that sky let fall
A flower from its cerulean wall.

I would that thus, when I shall see
The hour of death draw near to me,
Hope, blossoming within my heart,
May look to heaven as I depart.

—and the band running around from this bears as legend the most famous and most inspiring lines Mr. Bryant has written:

"Truth, crushed to earth, shall rise again;
The eternal years of God are hers."

The handles display a happy adaptation, in full open work, of the Indian corn plant, and are ornamented on the outside with the bursting bolls of cotton. Within perches the bobolink, Bryant's "Robert of Lincoln":—

Merrily swinging on brier and weed,
Near to the nest of his little dame,
Over the mountain-side or mead,
Robert of Lincoln is telling his name:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Sung and safe is that nest of ours,
Hidden among the summer flowers,
Chee, chee, chee.

Robert of Lincoln is gayly dressed,
Wearing a bright black wedding coat;
White are his shoulders and white his crest,
Hear him call in his merry note:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Look, what a nice new coat is mine,
Sure there was never a bird so fine,
Chee, chee, chee.

This use of plants, as we have said, is a salient feature of the design. On the base of the neck is a formalized pattern of the primrose and the ivy leaf, symbolizing youth and old age,—the poet's eternal youth amid snow-crowned years,—which admirably replaces the Greek egg-and-dart design. The body of the vase is covered by a formal fret-work, among which the apple-blossoms, typical of fruitfulness, peep out, the elegant and amaranth, signifying poetry and immortality, being interwoven with them. The maize and cotton plants are again used on the lower part of the body, these being peculiarly American products, and at the foot of the vase is the leaf of the water-lily, which is symbolical of eloquence.

As originally designed this vase stood upon feet, which made it appear of the commonplace presentation sort and were quite incongruous with its general purpose. It seems to have occasioned some dissatisfaction among the other competitors that this design was permitted to be modified and improved from suggestions found in the competing vases. It has now, in place of the feet, a monumental pedestal, which admirably supports the design of the vase, and is simply adorned with a device of the lyre, crossed pens and broken shackles, the last of course suggesting Mr. Bryant's part in the anti-slavery reform.

The top, unlike all the other designs presented, is open,—a feature which has called out some criticism as making the vase incomplete and suggesting its use as a receptacle, of wine or flowers, rather than its true monumental purpose.

The vase here pictured and described is now being manufactured, and will forever remain as a tribute of gratitude from the citizens of New York to Mr. Bryant, in our Metropolitan Museum. Doubtless this new and effective method of commemoration will not be given over, and thus an impulse will be given to American art-manufacture that will do very much for its future. We are already competing with the world in this particular specialty and the originators of the Bryant vase have been doubly patriotic in at once becoming so eminent an American and so promoting this branch of American art.

THE GORHAM design was the most ambitious of any presented, and the vase was to have been four feet high. Its reduction in the engraving therefore makes it appear much less in diameter compared to the others than it really would be. Both the size and the elaborate workmanship which this design required increased its probable cost to nearly double the limit of the Committee, but the Gorham Company, with characteristic pride in art-manufacture and desire that what ought to be the finest piece of metal-work yet

designed; it is circular, thirty-eight inches in circumference, and about it in *alto-relievo* are six bold groups, illustrating different poems of Mr. Bryant's. These rest on a circular platform, on the front of which is the name W. C. Bryant, and which is ornamented at the side with wreaths of laurel.

The reader will gather a more full idea of the richness of the sculptured base from the outline drawing given of its full circumference. The figures in each of these groups are ten inches high, and wrought mostly in full re-



Design submitted by the Gorham Company, with Plan showing Groups upon the Pedestal.

produced in this country should in no way fall below the possibilities of the art, generously requested that the over-value (of nearly five thousand dollars) should be accepted as its contribution to the fund.

This vase is tall and slender, very beautiful in proportions, and of pure Greek outline, broken only somewhat below the middle by a twist fillet. The neck of the vase is quite plain, and the top is surmounted by a statuette figure of winged Fame, the wings out-spread and the hands holding the emblems of her power. The pedestal is the most original feature of this

lief. They are very ingeniously placed, so as to give each illustration the best relative effect, the picture from "Waiting by the Gate" being peculiarly suited for the front. The poems selected for illustration are 'Thanatopsis,' 'The Death of Slavery,' 'Waiting by the Gate,' 'The Conqueror's Grave,' 'A Day Dream,' and the translation of Homer's *Odyssey*. We quote from the *Art Journal* full descriptions of the groups, supplementing them with a few extracts which may serve pleasantly to refresh the memory.

"Thanatopsis" is represented by the figure of the poet, with a winged hour-glass at his feet, gazing with his mind's eye on the long train of ages, in figures from youth to decrepitude, and in costumes from classic and mediæval to modern times:—

As the long train
Of ages glide away, the sons of men,
The youth in life's green spring, and he who goes
In the full strength of years, matron, and maid,
And the sweet babe, and the gray-headed man,—
Shall one by one be gathered to thy side,
By those, who in their turn shall follow them.

So live, that when thy summons comes to join
The innumerable caravan, which moves
To that mysterious realm, where each shall take
His chamber in the silent halls of death,
Thou go not, like the quarry-slave at night,
Scourged to his dungeon, but sustained and soothed
By an unfaltering trust, approach thy grave,
Like one who wraps the drapery of his couch
About him, and lies down to pleasant dreams.

"The Death of Slavery" is typified by the three emancipated figures of the family; the man tossing his arms with broken shackles towards heaven and shouting; the woman holding up her free babe as she kneels to thank God for its new destiny:—

O thou great Wrong, that, through the slow-paced years,
Didst hold thy millions fettered, and didst wait
The scourge that drove the laborer to the field,
And turn a stony gaze on human tears,
Thy cruel reign is o'er;
Thy bondmen cry no more
In terror at the menace of thy eye;
For He who marks the bounds of guilty power,
Long-suffering hath heard the captive's cry,
And touched his shackles at the appointed hour,
And lo! they fall, and he whose limbs they galled
Stands in his native manhood, disenthralled.

"Waiting by the Gate" shows four young children floating in clouds out of the gate towards heaven, indicated by rays of glory and circles of stars in the background; leaving Death, symbolized by the scythe, behind them:—

Beside a massive gateway built up in years gone by,
Upon whose top the clouds in eternal shadow lie,
While streams the evening sunshine on quiet wood and lea,
I stand and calmly wait till the linges turn for me.

* * * * *

Once more the gates are opened; "an infant group go out,
The sweet smile quenched forever, and scilled the sprightly shout,
Oh frail, frail tree of Life, that upon the greensward strows
Its fair young buds unopened, with every wind that blows!

"The Conqueror's Grave" is illustrated by the ascent of the soul, in a female figure, and radiant with celestial joy, rising to heaven amidst a shower of flowers thrown to her from welcoming hands. On the ground beneath her feet is a figure of Death, disarmed, chained down, and writhing in rage that he is powerless to do her harm:—

Within this lowly grave a Conqueror lies,
And yet the monument proclaims it not,
Nor round the sleeper's name hath chisel wrought
The emblems of a fame that never dies,
Ivy and anemone, in a graceful sheaf,
Twined with the laurel's fair, imperial leaf.
A simple name alone,
To the great world unknown,
Is graven here, and wild flowers, rising round,
Meek meadow-sweet and violets of the ground,
Lean lovingly against the humble stone.

Here, in the quiet earth, they laid apart
No man of iron mould and bloody hands,
Who sought to wreak upon the suffering lands
The passions that consumed his restless heart;
But one of tender spirit and delicate frame
Gentlest, in mien and mind,
Of gentle womankind,
Timidly shrinking from the breath of blame:
One in whose eyes the smile of kindness made
Its haunt, like flowers by sunny brooks in May,
Yet, at the thought of other's pain, a shade
Of sweeter sadness chased the smile away.

"A Day Dream" represents the poet seated on a rock overlooking the sea, with the waves dashing up nearly to his feet; and female forms appear rising from the sea, clad in thin drapery, with long, flowing tresses, sporting in and on the waves, and extending their arms to him:—

A day-dream by the dark-blue deep;
Was it a dream, or something more?
I sat where Poesillo's steep,
With its gray shelves, o'erhanging the shore.

On ruined Roman walls around
The poppy flaunted, for 'twas May;
And at my feet, with gentle sound,
Broke the light billows of the bay.

I sat and watched the eternal flow
Of those smooth billows toward the shore,
While quivering lines of light below,
Ran with them on the ocean-floor.

Till, from the deep, there seemed to rise
White arms upon the waves outspread,
Young faces, lit with soft blue eyes,
And smooth, round cheeks, just touched with red.

Their long, fair tresses, tinged with gold,
Lay floating on the ocean-streams,
And such their brows as birds behold—
Lovestrichen bards, in morning dreams.

"The Odyssey" is represented by the figure of Ulysses sailing away from Calypso's enchanted island, with his hand on the helm of his ship, and gazing for guidance on the Pleiades.

A large slightly sunk panel, containing a portrait in low relief of Mr. Bryant, as he now appears, in his familiar cloak, is the prominent feature of the ornamentation on the body of the vase. Around this portrait are branches of the laurel, about which twines a ribbon with inscriptions, "Journalist" in the centre below the portrait and at the sides "Poet," "Statesman," "Orator," "Lawyer,"—the latter vocation seeming to make up the requisite five. On the reverse was to be an ideal figure of Journalism, this apparently being the phase of Mr. Bryant's life most prominent in this designer's mind, with branches of the power-symbolizing oak. The foot of the vase is bordered with laurel wreaths; above, the ornamentation is on one side of wheat, suggesting "The Song of the Sower," and on the other "The Yellow Violet." The handles illustrate Mr. Bryant's poems on birds. On the one side is the Water-fowl, on the other "Robert of Lincoln," while the reverse of the handles were to picture "The Coming of the Birds," and "The Last Bird:—

When beechen buds begin to swell,
And woods the blue-bird's warble know
The yellow violet's modest bell
Preys from the last year's leaves below.

Ere russet fields their green resume,
Sweet flower, I love, in forest bare,
To meet thee, when thy faint perfume
Alone is in the virgin air.

Of all her train, the hands of Spring
First plant thee in the watery mould,
And I have seen thee blossoming
Beside the snow-bank's edges cold.

Thy parent sun, who bade thee view
Pale skies, and chilling moisture sip,
Has bathed thee in his own bright hue,
And streaked with jet thy glowing lip.

Yet slight thy form, and low thy seat,
And earthward bent thy gentle eye,
Unspat the passing view to meet,
When lottier flowers are flaunting high.

Oh, in the sunless April day,
Thy early smile has stayed my walk;
But midst the gorgeous bloom of May,
I passed thee on thy humble stalk.

So they, who climb to wealth, forget,
The friends in darker fortunes tried.
I copied them—but I regret
That I should ape the ways of pride.

And when again the genial hour
Awakes the painted tresses of light,
I'll not overlook the modest flower
That made the woods of April bright.

THE design submitted by the WHITING COMPANY was very rich in variety of detail, and it, also, loses some of its effects, for this reason, in the reduction of the engraving. The vase was to be thirty-eight inches high, oxydized and parcel gilt, and its cost would also have far exceeded the sum named by the Committee. The Whiting Company proposed however to make the same offer as that made by the Gorham Company—a generous rivalry in devotion to American art interests and in far-sighted policy which is highly to the credit of both.

The aim of the Whiting artist has evidently been to adhere to a severity of outline in the base and body of the work that the rich ornamentation above might be more effective and that the free use of sculpture, as it were, necessary to the suitable illustration of the prominent features in the poems and life of Mr. Bryant might be introduced without giving an appearance of excess. The most marked feature of divergence from the other designs is this base. Three adopted a pedestal fully ornamented with figures in full relief, and one used a base of four feet. Mr. Osborn, considering the monu-



Design submitted by the Whiting Company.

The body of this vase is also of classic outline, the shape of an egg, flattened at the heavier end. This form is however much varied in effect by the handles, which are of a rich open-work scroll pattern, and the mouth and cover, which are bent in varied curves. The base rests on a square monumental pedestal of variegated marble, with silver adornments, while from the cover rises the fine group of Truth and Error, in illustration of the familiar lines already quoted.

mental purpose of the entire work, preferred to give that character to his base, and his thought has since been adopted, as appears in the engraving, for the accepted vase. The Whiting pedestal is however by no means bare, for there are four panels of silver with illustrations in *repousse* set in on the respective sides, while above and below them narrow borders of silver surround the base. The front panel pictures "the endless procession" of "Thanatopsis," a host of shadowy forms following to the grave; on the

other face was to be an illustration from "The Conqueror's Grave." The panels on the two sides were to represent the earlier and later days of the poet, Homer's day and our own. The one shows "Homer reciting his poetry," the other Mr. Bryant himself surrounded by the modern means of disseminating thought,—the telegraph and the cylinder press suggesting Mr. Bryant's career as a journalist.

But it is in the ornamentation of the body of the vase that the peculiar originality and beauty of this vase is shown. In the front centre is a medallion containing a fine portrait of Mr. Bryant, his shoulders cloaked, the frame being a wreath of laurel. Below this is the monogram 1874. The reverse was to have a shield medallion for an inscription. The four spaces left were to be filled with illustrations from Mr. Bryant's poems.

That on the right of the portrait medallion was to be occupied by an exquisitely wrought picture from the "Song of the Sower":—

The maples reddened in the sun;
In autumn gold the beeches stand;
Rest, faithful plough, thy work is done
Upon the teeming land.
Bordered with trees whose gay leaves fly
On every breath that sweeps the sky
The fresh dark acres furrowed lie,
And ask the sower's hand.
Loose the tired steer and let him go
To pasture where the gentians blow,
And we, who till the meadows round,
Fling we the golden shower around.

Fling wide the generous grain; we fling
O'er the dark mould the green of spring.
For thick the emerald blades shall grow,
When first the March winds melt the snow,
And to the sleeping flowers, below,
The early beauties fling.

Fling wide the grain; we give the fields
The ears that nod in summer's gale,
The shining stems that summer gilds,
The harvest that doth dress the vale,
And swells, and amber sea, between
The fall-leaved woods, its shores of green.
Hark! from the murmuring clouds I hear
Glad voices of the coming year.
The song of him who binds the grain,
The shout of those that load the wain,
And from the distant granary comes
The clatter of the farmer's trail
And steadily the millstone rattle
Down in the willowy vale.

Fling wide the golden shower; we trust
The strength of armies to the dust.
This peaceful lex may happily yield
In harvest for the sown field.
Ha! let ye not your fingers thrill,
As o'er them, in the yellow grains,
Glide the warm drops of blood that fill,
For mortal strife, the warrior's veins;
Such as, on Solferino's day,
Slaked the brown sand, and flowed away:—
Flowed till the herds, on Mincio's brink,
Snuffed the red stream and feared to drink;—
Blood that in deeper pools shall lie,
On the sad earth, as time grows gray,
When men by deadlier arts shall die,
And deeper darkness blot the sky
Above the thundering fray;
And realms that hear the battle-cry,
Shall sicken with dismay;
And chieftains to the war shall lead
Whole nations, with the tempest's speed,
To perish in a day:—
Till man, by love and mercy taught,
Shall rue the wreck his fury wrought,
And lay the sword away.
Oh strew, with pausing, shuddering hand,
The seed upon the helpless land,
As if, at every step, ye cast
Ye pelting hail and living blast.

That on the left was to be given to an illustration from the dainty conception of "Sella":—

Then Sella hung the slippers in the porch
Of that broad rustic lodge, and all who passed,
Admired their fair contrasting, yet none knew
Who left them by the brook. And now, at length,
May, with her flowers and singing birds, had gone,
And on bright streams and into deep wells shone
The high, midsummer sun. At noon,
Sella was missed from the accustomed meal.
They sought her in her favorite haunts, they looked
By the great rock, and far along the stream
And slanted in the sunset woods, but none knew
Night came, and forth the sorrowing household went
With torches over the wide pasture grounds
To pool and thicket, marsh and briery dell,
And solitary valley far away.
The morning came, and Sella was not found.
The sun climbed high; they sought her still; the moon,
The hot and silent noon, heard Sella's name,
Uttered with a sigh, to water, to water,
O'er which the eagle hovered. As the sun
Stooped toward the amber west to bring the close
Of that sad second day, and, with red eyes,
The mother sat within her home alone,
Sella was at her side. A shriek of joy

Broke the sad silence; glad, warm tears were shed,
And words of gladness uttered. "Oh, forgive,"
The maiden said, "that I could e'er forget
Thy wishes for a moment. I just tried
The slippers on, amazed to see them shaped
So fairly to my feet, when all at once,
I felt my steps upborne and hurried on
Almost as if with wings. A strange delight,
Blent with a thrill of fear, o'ermastered me,
And, ere I knew, my plashing steps were set
Within the rival's pebbly bed, and I
Was rushing down the current. By my side
Tipped one as beautiful as ever looked
From white clouds in a dream; and, as we ran,
She talked with musical voice and sweetly laughed.
Gayly we leaped the crag and swam the pool,
And swept with dimpling eddies round the rock,
And glided between shady meadow-banks.
The streamlet, broadening as we went, became
A swelling river, and we shot along
By stately towns, and under leaping masts
Of gallant barks, nor lured by the shore
Of blooming gardens; onward, onward still,
The same strong impulse bore me till, at last,
We entered the great deep, and passed below
His billows, into boundless spaces, lit
With a greenish haze. Here were mighty groves
Far down the ocean-valleys, and between
Lay what might seem fair meadows, softly tinged
With orange and with crimson. Here arose
Tall stems, that, rooted in the depths below,
Sung idly with the motions of the sea;
And here were shrubberies in whose many crevices
The creatures of the deep made home. My friend
Named the strange growths, the pretty corallines,
The dulse with crimson leaves, and, streaming far,
Sea-nought and sea-lice. Here the tangled spread
Of broad thick fronds, with dew-drops ever beneath;
And oft we trod a waste of pearl sand,
Spotted with rosy shells, and thence looked in
At caverns of the sea whose rock-roofed halls
Lay in blue twilight. As we moved along,
The dwellers of the deep, in mighty herds,
Passed by us, reverently they passed us by,
Long trains of dolphins rolling through the brine,
Huge whales, that drew the waters after them,
A torrent-stream, and hideous hammer-heads,
Chasing their prey; I shuddered as they came;
Gently they turned aside and gave us room."

Above the portrait was to be an illustration from "The Little People of the Snow":—

Now you must know that, in those early times,
When autumn days grew pale, their came a troop
Of chilblike forms from that cold mountain-top;
With trailing garments through the air they came,
Or walked the ground with girled legs, and three
Spangles of silver frost upon the grass,
And edged the brook with glistening parapets,
And built it crystal bridges, touched the pool,
And turned its face to glass, or, rising thence,
They shook their from their full laps, the soft, light snow
And buried the great earth, as autumn winds
Bury the forest-floor in heaps of leaves.
A beautiful race were they, with baby brows,
And fair, bright locks, and voices like the sound
Of steps on the crisp snow, in which they talked
With man, as friends with friend. A merry sight
It was, when, crowding round the traveller,
They smote him with their heaviest snow-flakes, flung
Needles of frost in handfuls at his cheeks,
And, of the light wreaths of his smoking breath,
Wove a white fringe for his brown beard, and laughed
Their slender laugh to see him wink and grin
And make grim faces as he floundered on.

The opposite space was to suggest the "Lines to a Water-fowl." On the neck is "Robert of Lincoln," in full relief and full flush of spirits, and there were to be three other subjects to match this—making no less than ten picture-illustrations from the poems. Below the zone of the vase is a row of small varied manes, in which is depicted the abundant animal life voiced in Bryant's song, the squirrel, rabbit, marten, beaver and others which he mentions, while still below, as the vase tapers, is a series of sunken panels, in which are to be found the wild flowers and grasses he so loves, the fern, the fringed gentian, the mullen, the hollyhock, sunflower, typifying his fondness for natural forms. At the very foot there is a wreath of laurels entwined with a ribbon, which was to have the titles of the best-known poems of our poet-laureate. In the ornamentation of the handles the cotton plant and sugar cane are introduced, proclaiming the nationality of the poet.

But the crowning glory of this design is the allegorical group which surmounts it, and which is exquisitely modelled. The pinching of the neck seems to have been intended by the artist to give effectiveness to this vigorous group. Below writhes Error, with hideous and distorted face, the mask fallen to reveal his horrid nature. Above him soars the figure of Truth, rising to heaven. A lovely female shape, with face chastened by the experience of suffering, the manacles sundown from her hands and feet. A superb effect has been wrought in the design by making the figure itself independent of support, which is ingeniously found in the drapery of her garment. The airy lightness of the figure, seemingly unsupported from any base, is exquisite, and the group is one of the finest interpretations of the poem which can be conceived.

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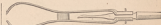
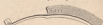
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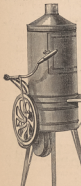
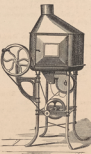
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Chucks, Rolling Mills, Draw
Plates, Pierz's Saws, Bone
Saw Magnets, Nuts, Ingots,
Chasing Tools, Engravers'
Tools, Brush Wheels, Hand
Brushes, Horns, Boxes,
Hinges, Triples, German Silver,
Brass, &c.

AGENTS FOR THE KEYSTONE FORCE.

Sole Agents for Chateau French Engraving Paper.

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No. 62 Chatham Street, New York.**Buyers' Directory.**

A Guide to the prominent Wholesale Houses in the Watch, Clock, Jewelry and kindred branches of Trade in New York, Chicago and Providence.

Clock Companies.American Clock Co.—Manufacturers of Clocks of all kinds. Salesrooms, No. 281 Broadway.
Ansonia Brass & Copper Co.—19 & 21 Cliff street, New York.

Coches, Benjamin J.—Wholesale Dealer in all kinds of Clocks and Regulators, No. 127 North 8th Street, Philadelphia, Pa.

Kroehler, F.—Clocks and Regulators of every description, No. 8 Courtland Street, N. Y.

United States Clock Co.—Henry Turbine & Son, 3 Courtland street, N. Y. Manufacturers of Fine Regulators and American Clocks.

Waterbury Clock Co.—M. Bailey, Treasurer, Manufacturers and Jobbers, No. 4 Courtland Street, N. Y. No. 100 Clark Street, Arcade Building, Chicago.

Wood, James—Manufacturer, Importer and Dealer of Fine Regulators and Clocks of every description 6 Courtland street, N. Y.

Cornals and Coral Jewelry.

Ericson Bros.—Established 1820—Importers of Coral Jewelry, 19 John street, N. Y. Manufacturers of Coral Jewelry, 19 John street, N. Y. Manufacturers of Coral Jewelry, 19 John street, N. Y.

Lawson & Grunberg—Manufacturer Fine Gold and Coral Jewelry; Coral Jewelry altered, retouched and repaired, No. 65 Nassau St., N. Y.

Cameo Cutters, Etc.

Bonet, L.—(Successor to Bernard & Bonet), Cameo Likenesses, No. 299 Broadway, New York.

Charms & Gold Watch Keys.

Rupp & Hohl—Manufacturing Jewellers, Charms and Gold Watch Keys, with French and English Batches, a specialty, 15 John st., N. Y.

Diamonds.

Bernhard, A. & Co.—Manufacturing Jewellers & Importers of Diamonds, Fine Jewelry, &c. 169 Broadway, Gilsey building, N. Y.

Blasinger, E.—Importers of Diamonds, No. 182 Broadway, N. Y.

Pera, Henry—Importer of Diamonds, No. 9 Maiden Lane, New York.

Morch, Jacob—Importer of Diamonds, Pearls, French & Italian Stone Carvers, Amethysts, Onyxes, and Precious Stones, Diamonds in pairs a specialty, No. 23 Maiden Lane, N. Y.

Neresheimer, B. J.—Importer of Fine Diamonds, No. 5 Maiden Lane, New York.

Diamonds and Diamond Jewelry.

Bornemann, Louis—Manufacturer of Diamond Jewelry, Russia a specialty; superior finish and original designs. Send for Price List of Single Articles, 167 & 171 Broadway, N. Y.

Smith & Hedges—Importers of Diamonds Exclusively, and Manufacturers of Fine Diamond Jewelry, 1 Maiden Lane, cor. Broadway, N. Y.

Troyer, Charles & Troyer, Importers Diamonds and Diamond Jewelry, 5 Bond street, N. Y.

Diamond Setters, Etc.

Friend, S.—Manufacturer of Fine Jewelry, and Diamond Set, 40 John street, N. Y.

Enamellers, Etc.

Cruz, Jas. C.—Enameler of Fine Jewelry, Flowers, Birds, &c., Enamelled in colors, Band Bracelets (a specialty), 77 Nassau Street, N. Y.

Dials, &c.

Casar Brothers—Manufacturers of Enamelled Clock and Meter Dials, also Watch Makers, No. 42 John Street, New York.

Gold, John T.—(Successor to the late T. Gold) Enamelled Watch Dial Maker, No. 81 Nassau Street, New York.

Engravers and Die Sinkers.

Arley, William—Designer & Engraver of Watch Cases, Jewelry, &c. Monograms, Crests, Lettering and Ornamental Engraving, No. 78 Nassau street, Room N. Y.

Dolbey & Wood—Engravers of Unsurpassed Precision, 109 & 171 Broadway, Room 23, New York.

Fackner, Edward—Curver, Engraver and Chaser on Jewelry, Monograms, Lettering, &c. No. 19 John street, N. Y.

Henning, Albert J.—Die Sinker & Engraver, 317 Centre street, N. Y. Dies for Jewelers and Silver-smiths, Engraving Plates, Seals, &c.

Knapp, Charles—Engraver, Die Sinker and Designer for Jewelry, &c. 14 and 18 S. Stanton and Hoags for Rings, &c. 41 Maiden L. N. Y.

Melt, Robert H.—Engraver and Die Sinker. Steel Stamps for Watch Case Makers and Silver Smiths a specialty, 42 John St., N. Y.

Park, William—Stone Seal & Cameo Engraver and Die Sinker. Masonic Devices and Engraving for Incorporation, 202 Broadway, N. Y. Room 14.

Schuller, J. Dan'l.—Stone Seal Engraver, Arms, Crests, Initials and Monograms engraved on Stone Seals, &c. No. 71 Nassau Street, N. Y.

Electro Platers.Jandhuur, P. & Son—Gold and Silver Electro Platers & Fine Golds, Coloring Etrousans and Gold Jewelry specialty, 71 Nassau St., N. Y.
Normandean, P. A.—Electro Gold & Silver Nickel Plater, Coloring, Gilding and Silver work a specialty, No. 108 Nassau Street, N. Y. Sole Agent of New York Nickel Plating Company. Licensed by United Nickel Company.**Nickel Watch Finishers.**

Boynett, E. & Co.—Nickel Watch Finishers and Nickelizers. Brass Engraving a specialty. No. 5 Maiden Lane, N. Y.

Fancy Goods, Clocks, Bronzes, Etc.

Hinrichs, C. P. & Co.—Importer and Dealer in French, English and German Fancy Goods etc. etc. 29, 31 & 33 Park Place, N. Y.

Magnin, Y. & Co.—Importers of Clocks, Bronzes, Musical Boxes & Rich Fancy Goods etc. etc. 602 Broadway.

Le Bouteiller & Rides—Importers of Fancy Goods, Clocks, Bronzes, &c. No. 10 Maiden Lane, N. Y.

Gallery Settings.

Walker, Edward—Gallery Settings & Incrusted Stones, 12 and 14 John street, N. Y.

Gold Chains, Etc.

Beck, J. & Co.—Manufacturers of Fine Gold Chains and Chain Bracelets, 10 Liberty place, near Maiden lane, N. Y.

Polak & Dreyfus—Manufacturers of Gold Chains with Patent Safety Swivel Attachment, No. 4 Maiden Lane, N. Y.

Kneufman, Bro.—Manufacturers of Gold Chains and Chain Bracelets, 28 1/2 street, Factory, 718 5th street, N. Y.

Leblitz, Albert—Manufacturer of Fine Gold Chains. All goods warranted, No. 35 Maiden Lane, New York.

Smalls, Dorrance & Co.—Manufacturers of the Celebrated Woven Fabric Gold Chains and Chain Bracelets, 5 Maiden Lane.

Gold Pens, Etc.

Aikin, Lambert & Co.—Manufacturers of Choice Gold Pens, Cases, Holders, Toothpicks, etc. 12 Maiden Lane, N. Y.

Todd, Edward & Co.—Manufacturers of Gold Pens, Pencil Cases, Tooth Picks, etc. 602 Broadway, N. Y. Factory, Brooklyn.

Gold Rings.

Bowden, Joseph B.—Manufacturing Jeweler, Solid Gold Rings a specialty, No. 11 Maiden Lane, New York.

Ely, W. H.—Manufacturer of Solid Gold Rings of every description. No. 58 Nassau Street, New York.

Hair Jewelry.

Bernhard, A. & Co.—Manufacturers of Fine Hair Jewelry and Device Work. The latest styles. 149 Broadway, Room 2, New York.

Frasse, H. C.—Late Charles Frasse & Co. Mant Hair Jewelry & Device Work, Importer of Alloying Copper. Sample books always on hand, 109 & 171 Broadway.

Jewelry Cases, Fancy Boxes, Etc.

Braun, Ch. E.—Manufacturer of Jewelry Boxes, Trays for Show Cases, &c. 62 Chatham street, N. Y.

Dahlem, W.—Manufacturer of Cases for Jewelry and Silverware, No. 85 Nassau Street, N. Y.

Sters, L.—Manufacturer and Importer of Cases for Jewelry, Watches, Silverware, etc. 15 John street, N. Y.

Welch & Miller—Manufacturers of Morocco Velvet, and Satin Jewelry Cases, Trays, etc. All stock always on hand, No. 109 Broadway, N. Y.

Wiggers & Froelich—Manufacturers of Fine Jewelry Cases for Jewelry, Watches, Silverware, Trays and Porcelain Ring Trays, &c. No. 90 Nassau Street, N. Y.

Jewelry—Fine.

Aikin, Lambert & Co.—Manufacturers. General stock of Reliable Jewelry, No. 12 Maiden Lane, N. Y.

Baldwin, Benton & Peterson—Manufacturers of Fine Jewelry, No. 1 Bond street, N. Y.

Ball & Bernard—Manufacturers of the Self-Adjusting Band Bracelet Guard, (Patent a Specialty), No. 9 John Street, N. Y.

Berthman & Broad—Manufacturers of Fine Jewelry, Stones and Stone Rings a specialty. Orders promptly attended to. 41 Maiden Lane, N. Y.

Benton, Andrews & Co.—Manufacturers of Fine Jewelry, No. 35 Maiden Lane, N. Y.

Benson and Birman Jewelry a specialty.

Block & Parker—Manufacturers of Fine Jewelry, Locks, Seals, &c. Special attention given to ordered work, 22 Nassau street, N. Y.

Blasinger, E.—Importer of Fine Jewelry, Lockets, Chains, Neck Chains, &c. No. 189 Broadway, New York.

Brown, C. & Co.—Manufacturers of Fine Gold, Enamelled and Plain Lockets, No. 191 Broadway, N. Y.

Bruscia, H. & Co.—Manufacturers of Fine Jewelry and Brimble's Patent Lockets, No. 9 Maiden Lane, New York.

Carter, Jewell & Sloan—Manufacturing Jewelers, 1 Bond Street, N. Y.

Chattellier & Spence—Manufacturing Jeweler, No. 612 Broadway, N. Y.

Pineas & Stevens—Manufacturers of Fine Jewelry, Watches, Clocks, etc. Office, 610 N. 9th Main Lane, N. Y.

Robert Ross—Manufacturers and Importers of Fine Jewelry, Watches, Clocks, etc. Office, 100 N. 9th Main Lane, N. Y.

St. John—Manufacturers of Fine Jewelry, Watches, Clocks, etc. Office, 100 N. 9th Main Lane, N. Y.

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Masonic and Odd Fellows' Jewels.

Hayes W. P. Co.—Manufacturers of Lockets, Charms, Masonic, I. O. O. F., K. of P., Temperance, D. O. H., Grangers and Society Pins and Charms for every known order. 213 Broadway, cor. Fulton street, N. Y.

Luther, J. P.—Masonic & Odd Fellows' Jewels, Charms and Pins a specialty. Also Pins manufactured for all secret orders. 79 Nassau street, N. Y.

Miller & B.—Jewelry, No. 65 Nassau street, (Room 11, 2d floor), N. Y. Jewelry, Masonic Emblems and Badges made to order.

Opticians.

Burkhard, Bond & Co.—Manufacturers of Spectacles, etc., generally accepted. Publishes on hand set to order, No. 81 Nassau St., N. Y.

Kell, John—Manufacturer of Gold Eye-Glasses and Spectacles, No. 67 Nassau street, N. Y. All kinds of repairing neatly executed.

Du Bois, Geo. W.—Successor to A. Landberg, Importer and Manufacturer of Optical Goods, 30 Maiden Lane, Box 3903, N. Y.

Reid, Walter—Repairing Spectacles, Eye Glasses, etc., generally accepted. Publishes on hand set to order, No. 81 Nassau St., N. Y.

Buttle, Wm. J.—Manufacturer of Eye Glasses and Spectacles, No. 100 Nassau street, N. Y. (Price List by mail), 39 Maiden Lane.

Rings and Shanks.

Bryant & Bentley—Manufacturing Jewelers, 390 Paterson Hall Solder Hints, 14 Maiden Lane, N. Y.

Knepp, C.—Manufacturer of 14 and 18 karat Rings and Shanks, 14 Maiden Lane, N. Y.

Saws-Plating.

Schmidt, M. & Co.—Importers of all kinds of Plating Saws, for Jewelers, Wood Workers and others. No. 212 Broadway, Box 4798.

Silverware.

Gorham Manufacturing Co.—1 Bond Street, N. Y. Whiting Manufacturing Co.—Manufacturers of Sterling Silverware, 10 Broadway, N. Y.

Silver Plated Ware.

Manhattan Plating Co. 34 John street, N. Y.—Plating Silverware, White Metal Plated Ware, Repairing & re-plating on the premises.

Meriden Britannia Co.—Manufacturers of Silverware, 140 N. 9th Main Lane, N. Y.

Rogers & B.—Manufacturers of Reliable Silver Plated Ware, No. 208 Broadway, N. Y.

Reed & Barton—Manufacturers of Fine Plated and Table Ware, of every description, No. 2 Broadway, N. Y.

Simpson, Hall, Miller & Co.—Manufacturers of Fine Silver Plated Ware, No. 678 Broadway, N. Y.

Show Cases, Etc.

Becker, John—Manufacturer of Show Cases, Jewelry Trays always on hand, 19 Howard street, N. Y.

Hell & Son—Manufacturers of all kinds of Show Cases, 108 & 110 Chatham street, N. Y.

Kelly, P. J.—Manufacturer of Show Cases, Counters and Refrigerators, 45 & 47 New Bowery & 23 James street, N. Y.

Kraft & Hoffmeister—Manufacturers of Metal Show Cases, Jewelry Trays always on hand, 8 & 10 North William street, N. Y.

Spectacle Case Manufacturers.

Koenen, A. & Bro.—Manufacturers of Leather Spectacle Cases, 64 Nassau street, N. Y.

Thermometers.

Tagliabue—Thermometer, Barometer and Hydrometer Manufacturer, 302 Pearl street—near Beckman, N. Y.

Trinkle Manufacturers.

Burkhard, Bond & Co.—Manufacturers of Gold & Silver Trinkles, 14 Maiden Lane, N. Y.

Ketcham & McDougall—Improved Gold & Silver Trinkles, 14 Maiden Lane, N. Y.

Walking Cases.

Locklin, F. P.—Manufacturer of Gold and Silver-headed Walking Cases, Jewelry, etc., No. 142 Fulton street, N. Y.

Rust & Peck—Manufacturers of Walking Cases, 343 Broadway, N. Y.

Waterman, W. H.—Manufacturer of Fine Gold and Silver-headed Walking Cases, No. 115 Nassau street, N. Y. A specialty made of Presentation Cases.

Watch Companies.

The Philadelphia Watch Co.—No. 618 Chestnut Street, Philadelphia. New York Agency, 1.

The International Watch Company—(Factory, Schaffhausen)—Agents, Schaffhausen & Co., 173 Broadway, N. Y.

Watch and Chronometer Jeweler.—Case, James—Watch and Chronometer Jeweler and Patent Maker, 78 Nassau street, Room 8. Privately inserted in Times, Balance, Staffs, etc.

Watch Importers, Etc.

Abry, J. A.—Importers of Watches, No. 63 Nassau Street, N. Y. Sole Importers of Vacheron & Constantin watches, 100 Nassau Street, N. Y.

Alkin, Lambert & Co.—Importers of Watches, Sole Agents for Paul Breton & Chas. Lator, 100 Nassau Street, N. Y.

Barnes & Co.—Watch & Chronometer Makers, Dealers in and Importers of Fine Watches, No. 3 John Street, N. Y.

Bourgeois—Importers of Watches from their own manufactory at Blonay, Switzerland, 20 Maiden Lane, N. Y.

Byers, T. B.—Importers of Watches and Materials, Dealers in Fine Jewelry, 327 Broadway, N. Y.

Conover, David P. & Co.—American Watches, Wholesale Salesmen, southeast corner 7th and Chestnut streets, Philadelphia.

Cross & Bequith—Importers of Watches, Watch Tools and Materials, dealers in American Watches, No. 21 Maiden Lane, N. Y.

Dres, Henry E.—Importers of Watches and Watch Case manufacturers. Agent for the "Perpetual" Watch, and jobber in America, 100 Nassau Street, N. Y.

Dubois, Francis & Co.—36 Maiden Lane, N. Y. Importers of Watches and Manufacturers of Watch Cases.

Fremont, Goldsmith & Co.—Importers of Watches, Jewelry, and Precision Stones, No. 8 Maiden Lane, N. Y.

Glitz, Charles—Importers of Watches—Dealer in American Watches, Gold and Silver Cases, No. 1 Maiden Lane, N. Y.

Haldiman, E. A.—Importers of Watches, Tools and Materials, 60 Nassau St. N. Y.

Kahn, L. & M.—Importers of Watches, No. 10 Maiden Lane, New York.

Keller, L. H.—(Successor to G. A. Huguenin), Importer of Fine Watch and French Clock Watches, No. 21 Nassau Street, N. Y.

Lutz, L. A.—(Successor to Lutz Bros.)—Importer and Manufacturer of Watches—fine American Watches, 100 Nassau Street, N. Y.

Magnin, V. J. & Guerin & Co.—Importers and Agents of the Narin Watch, No. 692 Broadway, N. Y.

Mathew, T. A.—Importers of Fine Watches and Sole Agents for the H. L. Mathew's Watches, No. 100 Nassau Street, N. Y.

Nicoud & Howard—Importers and Manufacturers of Watches, No. 14 John street, N. Y.

Pringle, J.—Importers of Watches, Diamonds, Jewelry, Gold Chains, etc., No. 15 Maiden Lane, N. Y.

Quelch & Bruger—Agents for the Borel & Courvoisier Nickel Movements, 15 Maiden Lane, N. Y.

Stain & Bruger—Importers and Jobbers of Swiss and American Watches, Chas. Jewell, 60 Nassau street, N. Y.

Stem, Broders & Co.—Importers of Swiss Watches and wholesale dealers in American Watches, No. 62 Nassau Street, N. Y.

Wassner, P.—Importer of Watches, Materials, Tools, etc., Sole Agent for Deummann's Main Springs, 100 Nassau street, N. Y.

Watch Cases.

Brown, J. A. & Co.—Manufacturers of The Ladd Patent Sifted Gold Watch Cases, etc., 11 Maiden Lane, N. Y. Factory, 55 Eldy street, Providence, R. I.

Jennings, Wm. C.—Manufacturer of Watch Cases, No. 35 John Street, New York.

Laurent, J.—Watch Case Manufacturer, Gold and Silver American Watch Cases constantly on hand, 150 Nassau Street, N. Y.

Vivro, S.—Manufacturer of Gold and Silver Watch Cases, 189 Broadway, N. Y. top floor.

Watch and Chronometer Repairer.—Conf. B.—Practical Watchmaker and Repairer, No. 26 John Street, N. Y. Repairing and adjusting of fine watch movements for the trade. All kinds of escape and stem winding wheels cut to order.

Watch Case Repairers.

Chemidlin & Cordier—Watch Case Repairers, 100 Nassau street, rear building, Importers of Manufacturers of Silver Cases.

Tarbox, Hiram—Watch Case Repairing, Polishing and Engraving, 29 Nassau street, room 22, N. Y.

Watch Cases, Shades, Etc.

Berger, Albert, & Co.—Importer of Watch Glasses, Spectacles, Gold and Silver Glasses, etc., etc., No. 47 Maiden Lane, N. Y.

Brown, Edwin—Dealer in all kinds of Watch Cases, Clock Makers' Jewelers Glasses, etc., No. 40 Maiden Lane, N. Y.

Hill, Robert B.—Manufacturer of Watch Glasses, etc., dealer in fine watch cases, but glass specialty; also, Jeweler's Glasses. 75 & 77 Nassau Street, N. Y.

Walter, A. & Co.—Importers and manufacturers of Watch Glasses, Spectacles, Clocks, Musical Boxes, etc., No. 40 Maiden Lane, N. Y.

Watchman's Time Detectors.

Imbrie, C. & Co.—Importers of Watchman's Improved Time Detectors, No. 212 Broadway N. Y. Post Office Box 4798.

Chicago Directory.

Diamonds, Watches and Jewelry.

Cogswell, Weber & Co.—Watches, Jewelry and Silversmiths and Tools and Materials. In fact everything required in a retail jewelry store. 100 and 102 State Street, Chicago.

Estell & Jenkins—Wholesale Jewelers, Paul Jones, Chas. Lator, and Longine watches. Wholesale Agents for Alkin, Lamb & Co.'s Gold Pens, 111 Madison street, Chicago.

Giles—Importers of American Watches, Jewelry—Importers of Diamond, Watch, Spectacles, etc. Agents American Watch Co., No. 209 and 211 State Street, Chicago.

Oppenheimer, Henry & Co.—Importers and Dealers in Watches and Jewelry, No. 78 Monroe street, Chicago. New York Office, 8 Maiden Lane.

Morse, R. J. & Co.—Wholesale and Retail Dealers in Diamonds, Watches, Chains and Fine Jewelry, Corner Lake and Clark streets, Chicago.

Engraving.

Baker & Co.—Designers & Engravers on Wood, Pot, China, Cork, Cork and Mountaine street, Chicago. Dealers in Engraving Tools and Engravers outfit.

Reimann, G. & Co.—Nickel Plating of every description, Room 7, Lind Block, N. Y. Cor. Broadway and Nassau Street, Chicago. Nickel Plating of Type and Cut a specialty.

Opticians.

Manhass, L.—Optician, Importer and Manufacturer of Spectacles, 100 Nassau Street, N. Y. Madison, Chicago, Compans, Transits, etc. No. 88 Madison street, Chicago. (Tribune Building).

Plated and Gilt Jewelry, &c.—**Brown, D.**—No. 148 State Street, Chicago. Jobber of Gold Plated, Gilt and Jet Jewelry, Gold, Orde, Silver and Plated Watches, American and Swiss movements, Silverware, Spoons, Forks, etc.

Repairers for the Trade.

Dexter, W. W.—Watchmaker who Trade, Repairer of Fine Watches, Chronometers, French Clocks, Music Boxes, etc. Room 32, Tribune Building, Chicago.

Tools, Materials and Findings.—**Wilcox, W. W.**—Importer and Jobber of Jewelry, Watches, Chains, etc. Room 32, Tribune Building, Chicago.

Watches.—**Wendall, Charles & Co.**—Importers of Watches, Diamond Watches, Jewelry, etc. No. 170 State street, Chicago.

Watch Companies.

American Watch Company, of William, Mass. No. 4 Tribune Building, Chicago.

Elgin National Watch Company, No. 76 Monroe street, Chicago, Ills. New York Office, No. 100 Maiden Lane.

Providence Directory

Bracelets.

American Bracelet Co.—Manufacturers of Tamm's Patent Bracelet Bracelets, 26 Potter street, Providence, R. I.

Fine Jewelry.

Downs, Chas. & Co.—Manufacturers of Jewelry, and of Initial Buttons. No. 181 Durnance street, Providence, R. I.

Irons, Chas. F.—Manufacturer of Solid Gold Jewelry. Specialty, Emblems, Pins and Charms, 100 State Street, Providence, R. I.

Parce, Willard & Co.—Manufacturers of Jewelry, 95 Pine street, Providence, R. I.

White, Foster & Co.—Manufacturers of Fine Jewelry, Watches, Chains, etc. 100 Broadway, Drops and Buttons, No. 30 Potter St., Providence, R. I.

Jewelry—Plated.

Allen, Samuel & Co.—Manufacturers of Fine Electro Plate Jewelry. 95 Pine street, Providence, R. I.

Bridg, Wm. M. & Co.—Manufacturers of Gold Plated Jewelry of all kinds. No. 116 Pine St., Providence, R. I.

Luther Bros.—Manufacturers of Fine Gold Jewelry. Specialty, Pins and Charms, 100 State Street, Providence, R. I.

Parce, Willard & Co.—Manufacturers of Fine Jewelry, 95 Pine street, Providence, R. I.

White, Foster & Co.—Manufacturers of Fine Jewelry, Watches, Chains, etc. 100 Broadway, Drops and Buttons, No. 30 Potter St., Providence, R. I.

Rings.

Haskell, W. C.—Manufacturer of Jewelry, Pins, Rings, a specialty. 100 State Street, Providence, R. I.

McAdams, Wilson & Co.—Manufacturers of Jewelry, 95 Pine street, Providence, R. I.

Studs, Sleeve and Collar Buttons.—**Bucklin, Wm. C.**—Manufacturer of Jewelry, Studs, Pins, Rings, a specialty. 100 State Street, Providence, R. I.

E. Aug. Neresheimer,
IMPORTER OF DIAMONDS,
—AND—
Manufacturer of Fine **DIAMOND JEWELRY.**
No. 5 Maiden Lane,
NEW YORK.

L. & A. MATHEY,
Importers of FINE WATCHES and MOVEMENTS.
WATCH CASE MANUFACTURERS.
SOLE AGENTS FOR



Trade Mark. Which we have in all varieties, such as independent 4, 1-5 and split seconds, chronographs, minute repeaters, etc., in key and stem winders.

119 Fulton Street, New York.

American Watch Wholesale Salesroom.
DAVID F. CONOVER & CO.
(Successors to WM. B. WAIRNE & CO.)
Importers, Manufacturers and Wholesale Dealers in

Watches and Jewelry.
S. E. Corner Chestnut & 7th Sts.,
(FIRST FLOOR.)

DAVID F. CONOVER,
B. FRANK WILLIAMS,
C. EDGAR ROBERT.

PHILADELPHIA.

JOHN BLISS & CO.

Standard Marine

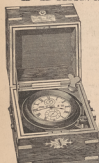
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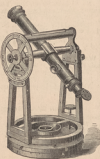
TRANSITS

FOR

Watchmaker's Use.



Standard Marine Chronometer
FOR KEEPING CORRECT TIME.



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DIFFERENT METHODS SUGGESTED TO DETERMINE THE SIZE AND WEIGHT OF BALANCES.

THE SIZE OF THE BALANCE.
The technique of Mouton says scarcely anything on this subject; only a paraphrase of those words taken by Jurgensen from Berthoud: "it is necessary that the weight and diameter of the balance should be in proportion to the moving power and the number of vibrations." This once stated, he offers callipers where several balances of different sizes give the same number of vibrations in the same time, and he comes to the same conclusion before attained by Berthoud: There is a just medium and its exactness has been proven by experience: if we follow the sizes of the balances, which experience proves to perform the best, we shall have the easiest and safest guide.*

The objection against the above by Porron was this: "If the size of the balance, he said, is in proportion to the number of vibrations in a given time, it would be necessary to have watches of the same size in small and large watches." This he declared impossible to realize. Although the argument of Porron was of no importance, it was in fact accepted, as nobody came to contradict it. The equivalent of five times the strength of the mainspring has also been suggested as the right measure of the diameter of the balance.

Two watchmakers of Paris ascertained that the length of a pendulum turned into a circle like a balance, gave the same number of oscillations. According to this rule the balance would have for its diameter a little less than the third part of the length of the pendulum. This like the last-mentioned principle, did not stand examination.

M. A. Valtz, a very skillful watchmaker of the city of Bordeaux, after having obtained experience on several occasions, ascertained that the most satisfactory performance was obtained from balances of a diameter that measured on the outside of the rim was equivalent to the whole part of the amount formed by the three distances of the wheel's centres and the radius of the escapement wheel.

They have generally agreed on the practice as a rule, according to A. Breguet and the Englishmen, who selected as a standard the Karlsruh chronometer, that the size of the balance is given by the motor circle, this being equivalent whether to the spring in the barrel, according to some opinions, or to the diameter of the wheel when wound up. To save any difference the cover of the barrel of a medium size, is being raised to the dignity of a motor circle.

Some artists who have not accepted this conclusion have remarked that the important power to know is that produced by the escapement wheel. For them the motor circle is in this same wheel and the size of the balance is confined by them to 2 times and 2 times and a half the wheel's diameter.

NOTE.—With the above mentioned methods we could attain very useful approximation, but it would be impossible to find a theoretical law or a general rule on any of them. In fact, actual practice is circumscribed to the imitation of the successful standards. We do not have at all any theoretical starting point.

THE THEORY OF THE BALANCE.

The above facts are enough to demonstrate that all the methods resorted to with the view of determining the proportions of an annual balance have not a theoretical starting point: the whole is confined to advise the study of the successful standards, and then to make a reproduction or amplification according to the kind of escapement you have selected.

The question we are about to discuss is entirely new. After fifteen years of labor, the result of which we have presented to the Exposition of 1867, if we have not come to satisfactory conclusion we are surely on the right way of a mathematical solution.

* Mr. Soulier's treatise enters in an early edition of Mouton's work—a recent edition in our possession treats the subject more fully.

Let us start from a principle which does not require any demonstration.

Every movement realized on the earth is under the control of the laws that form in a body the rational mechanics. It demonstrates to us that these movements can not surpass a certain quantity of speed or pressure, without giving rise to some cause of disturbance. But many of these causes are by no means within our power of investigation, because we have to find their source: in elastic actions and reactions of the material condition more or less intermittent; definitive or momentary change of the molecular constitution; production of heat; electric actions; the effects of centrifugal power; superabundance of moving power giving rise to excess of pressure, etc.

If we cannot always comprehend these causes we can at least ascertain their effects: for instance, a pendulum placed under the control of a power which could give the same an amount of oscillations different of those indicated by the tables for its virtual length loses the regularity of its movement.

It is same for the annual balance, the sizes of which are entirely strange to some known proportions. It is established fact for every watchmaker that he can substitute the balance of a watch for any other larger or smaller, if they want the set rid of it, and the watch will run. The Cyclopede states that by giving 20,000 vibrations per hour to the watches of that time, it was impossible to establish any regularity. Such is the case, when we do not follow closely those standards guaranteed by experience.

We leave to Science the task of searching for the explanation of these facts, it is enough for us to have them ascertained, so as to demonstrate by evidence that the maximum of regularity of an alternate movement of the turning radius of a watch, is connected in a relation to determine between the length of this radius and the number of vibrations to be made by it in an appointed time. If these facts, as a standard, having the diameter experience shows to be the most suitable, and making a given number of oscillations in a given time, we can very well determine the sizes of any other watch for any other number of oscillations in the same time, and as the same laws control the movements of the pendulum and of the balance, we come to the conclusion, queer indeed, that if we succeed in determining the length at which the pendulum realize the conditions required by the angular balance, we have at the same time established the law of the increase or decrease of the balance and also found the scale of its measure in the table of the length of the simple pendulum. We do not doubt that mathematics shall attain the solution of the problem, and in the meanwhile we have to circumscribe our knowledge to the experience

EXPERIENCES TO DETERMINE THE RELATION OF THE PENDULUM TO THE ANGULAR BALANCE.

If we carry a pendulum clock, the conditions upon which its regularity depends are so much changed that the piece loses all its regularity. The physical and mathematical reasons for this are so easy to explain and so well known that we do not consider it necessary to repeat them.

Could it be possible to construct a pendulum so that its motion would not be disturbed when carrying it from one place to another?

The answer to this question is given by the following two laws:

1st. A body deprived of inertia would be indifferent either to repose or movement.

2d. A body in motion resists a change in the direction of its motion in proportion to the velocity of that motion.

THE PENDULUM GIVES THE BALANCE'S SIZE.

If we consider the small simple pendulum vibrating per hour 29,343 vibrations according to the tables, we have to remark that this cipher is only exact when the oscillations are very small. When they become more extended they require a longer time to be realized. Therefore the retardation will be still more and more considerable according to the further increase of the arc of oscillation. Let us

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make it, as a supposition, equivalent to 270°.

Poisson, on his *Traité de Mécanique*, has left us a formula to determine this retardation, and in the case above mentioned it should be in 24 hours = 14,000 seconds over 86,400; such a loss as to make the right number of oscillations per hour to agree with the number of the tables as 124 is to 864. Thus this small pendulum of 14 millimeters would in reality vibrate only 14,000 vibrations per hour.

This small pendulum will not change at all when removed if we know how to keep it in a vertical position. To make it withstand any change of position, we have to make the stem just as long as the pendulum is, and the center of suspension at the two ends. In such a condition if we bring an elastic force to work on the axis and this comes to the place from where the motive power withdraws it, as gravity did, we shall have found the annular balance which can give for a certain number of oscillations the best guarantees in regulating, as it has better than any other one, in matters of inertia and speed, the necessary qualities to avoid any of the alterations resulting from a change of place, and can find to a certain extent in the hairspring, a force with all the modifications we might require.

THEORETICAL SIZE OF THE BALANCE.

For the same arc of vibration and the number of oscillations in the same time the turning radius of the annular balance is equal to the length of the simple pendulum that vibrates this number and runs through this arc.

From this data we have been able to draw the following table for a medium arc of 270°.

Pendulum Length Millimeter	Vibrations Per hour.	Balance Diameter Millimeter	Vibrations Per Second
329.0	3.600	478.0	1
60.0	7.200	120.0	2
20.5	10.800	50.0	3
14.8	14.400	29.6	4
9.6	18.000	* 19.2	5
6.6	21.600	15.2	6

We must notice that this table gives the diameter of a balance from any dimensions that could retard its motion. This diameter is a maximum. The length of the simple pendulum must be lessened when it is material and is mounted on pivots, because then it retards, and having this under consideration it is easy to suggest that in the application, the theoretical diameter of the balance must decrease according to the causes of retardation that changes its power from one escapement to another.

The said causes are these:

- 1st. The friction of the pivots.
- 2d. The influence of external motion.
- 3d. The friction on the ends of the pivots.
- 4th. Lateral pressure of the pivots subjected to the greater or less eccentric action of the hairspring.
- 5th. The resistance of the air.

For a certain number of oscillations (let us take, for instance, 15,000).

The detent-escapement has only one rise on two oscillations and its pivots are usually very fine and its hairspring is consequently developed; the turning radius of its balance is a little shorter than the theoretical radius.

The anchor-escapement in relation to the former has stronger pivots, and external motion, etc., causing greater retardation of the real radius of the balance to be more reduced.

The cylinder-escapement in proportion to the mass of its balance has large pivots, a considerable and continuous friction on the cylinder, a short hairspring that increases in a large proportion the lateral pressure of the pivots; the motion of the balance will be very slow, and to give it the right speed it is necessary to reduce the theoretical turning radius in proportion to the decrease of the number of vibrations.

It is understood that the regularity of the motion of the balance shall be altered to a certain extent with these resistances, and above all according to its wavering. For this reason a cylinder-escapement can

not be regulated as well as a detent-escapement, and the nearer we can go to the maximum theoretical radius by lessening the resistances, the better will be the chances for regularity.

EXPERIENCE'S DATA.
In the greatest number of chronometers with 15,000 vibrations which showed good performance, the size of the balance had a turning radius of about 3 millimeters. The difference to our table (6 millimeters about 3) could give a measure to some extent of the retarding resistances. The said differences ought to be larger because the amplitude of the arc was over 270° but the overplus is reduced to nothing by the isochronism of the hairspring.

Some balances attached to anchor-escapements, belonging to the table 10 (9,000, (15,000 vibrations) of the best regularity ever known, had a turning radius of about 8 millimeters 7. The difference due to the retarding causes must be of about 1 millimeter, perhaps less.

Finally, cylinder watches, in which the cylinder's radius was to the balance's turning radius = 1:15, this turning radius had about 7 millimeters. The difference due to the retarding causes should be here of about 23 millimeters.

By our experiences with the utmost care, after having them rectified, we might easily attain the elements of a formula that should enable us to estimate for every escapement the best regulating balance.

But that would be of no use, as we are not well acquainted with the value of frictions in the escapements; the others given by Berthoud and Romilly do not always agree, not only with the physical laws of friction, but with experience itself.

RELATIONS BETWEEN THE SIZE OF THE BALANCE, ITS WEIGHT AND THE STRENGTH OF THE HAIRSPRING.

(Moinet's Treatise.)
To regulate a chronometer, the wheels of which are already constructed, it is necessary to make the balance perform a determined number N of vibrations per second, so as to have:

$$NT = 1,$$

this requiring a certain relation between the size of the balance, its mass and weight and the strength of the hairspring.

If we call A the momentum of inertia of the balance L , the length of the hairspring and M its ratio of elasticity, depending upon the form of its section and of the co-efficient of elasticity of the matter which constitutes it, the vibrations will last for an isochronous hairspring, according to Mr. Philippi:

$$T = \pi \sqrt{\frac{AL}{M}}$$

P being the weight of the balance r the medium radius of its ring, and if the acceleration of gravity, we can take for the balance's momentum of inertia that of the ring without caring for that of the arms, the mass of which is very weak in relation to the mass of this ring. This momentum of inertia has for expression—

$$A = \frac{P}{g} r^2$$

We shall have then:

$$T^2 = \frac{P}{g} \cdot \frac{r^2}{M} \times \frac{L}{M} = \frac{1}{N^2}$$

And substantially a and g by its value.

$$P \cdot r^2 \cdot L = \frac{g}{N^2} \cdot 1,0063$$

$$M = \frac{g}{N^2} \cdot \frac{r^2}{L} \cdot N^2$$

This formula rests on the supposition that the kilogram is the unity of force and the meter the unity of length. But on account of the smallness and lightness of the mechanism of a chronometer it becomes more convenient to take for those two unities the gramme and the millimeter and the formula becomes then:

$$\frac{P \cdot r^2 \cdot L}{M} = 1006.8$$

$$M = \frac{r^2}{L} \cdot N^2$$

This relation shows that the larger the diameter is, the smaller the weight of the balance. It is convenient, nevertheless, not to reduce this weight too much, because the influence of some passive resistances, such as those of the air, increases

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with the speed. In common watches the ring's diameter is taken very often equal to that of the barrel, and so in the above mentioned formula only P, L and M shall be undetermined. In regulating is obtained by testing several hairsprings of different lengths until we reach the expected result. Then through practical trials we succeed in getting the value of L to the formula.

NECESSITY FOR COMPENSATION.

The formula of Mr. Phillips:

$$T = \sqrt{\frac{L}{M}}$$

shows that the duration of the vibration is independent of the amplitude, but to have this durability constant, it is necessary that the three quantities under the radical A, L and M be unalterable, or at least that with a system of reciprocal compensation they keep the same value to the radical.

The momentum of inertia A of the balance is, as we have said, the product of the multiplication of the ring's mass by the square of the medium radius. As this radius necessarily changes with the temperature, we must compensate the balance; this compensation offers very serious practical difficulties, and can never be realized in absolute nature.

The developed length of the hair-spring L is also changeable with the temperature.

Finally, the momentum of elasticity M depending on the form and sizes of the section of the hairspring and also on the molecular state of matter is under the influence of the changes of temperature.

The invariability of each one of the quantities A, L, M, taken separately, could not exist for any apparatus placed under the conditions essentially variable of the temperature; therefore it was considered necessary to look in the reciprocal compensation of these elements for the solution of the problem of isochronism.

In fact, it is only for the marine chronometers and the valuable watches that the compensation is required. For common watches it is enough to set apart the durations of vibrations between very circumscribed limits.

Practical Hints on Watch Repairing.

By EXCELSIOR—No. 5.

(54) In this article I gave the ordinary method of fitting hairsprings followed by good workmen, with such tools and appliances as every watchmaker has on hand to have in his shop. I shall now describe my own tool and method, by which we may test a spring in every way without injuring it in the least, and in a very short time, so that if it should not be suitable for the watch on trial it will still remain as perfect for the finest isochronal adjustment in another watch as when made,—a point of considerable importance when fitting fine and costly springs.

(55) The tool is not designed for fitting hairsprings only, but is applicable for measuring heights and distances in fitting staffs, cylinders, pinions, wheels, etc., for setting and resetting jewels, for right drilling of pivot holes, etc., clamping and countersinking, fitting screws, and many other uses, as will be seen hereafter. It is substantially an Upright Holder, carrying arbors for different uses, and so constructed that the upright portion can be moved in any direction to bring the arbor over any hole in the watch and then fastened. It consists of a clamp, to be fastened to the movement in any convenient place, carrying a round upright rod, movable up, down and sideways, and having a head through which moves a horizontal slide carrying the vertical arbors.

(56) The clamp is made from a thick piece of metal, steel, cast iron or hard brass, flat on its under surface, nearly rectangular in shape, 1½ inches long, by 1½ wide, half an inch thick, its ends and one eighth inch at the edges, with one edge hollowed out to form two projections or claws, one at each corner, and about 1½ inches apart. One end of these claws is there is a jaw, made something like the jaws on a universal lathe chuck, capable of being fastened parallel with the surface of the clamp, and also at any desired distance from it—so as to be screwed to the potence

plate above, or, if necessary, they can take in the whole thickness of the watch movement. The claws are slipped in between the bridges, or upon the plates, wherever a good leveling can be got, and the jaws are screwed up to hold the clamp firmly in place—its flat under surface being, of course, in the same plane with the plate of the watch. The jaws can be faced with thin leather or rubber, if thought best, to give them a good hold without much pressure. In that case, they could be clamped directly on the dial without danger. My own tool is made double, having two claws 1½ inches apart as above, and, on the opposite side of the clamp, two other claws or projections, one each inch apart, so that one side or the other will fit readily upon all sizes of movements. The jaws are also reversible, being turned at their centre to point toward either pair of claws which are in use.

(57) Through the centre of this piece or clamp is drilled a vertical hole to take an upright steel rod ¼ inch in diameter, and about 1½ inches long, having a head at its top, and fastened at any desired height by a screw, like the centres in the bow-lathe. In the head is a rectangular slot through which slides, horizontally, a steel strip 1½ inches wide and ¼ thick, (a piece of an old pair of tweezers will do), edge up, and secured by a screw, as shown by a screw. This strip also has an enlargement or head at its inner end, with a vertical hole to take in the different arbors to be used.

These arbors may be centres of your bow-lathe, or depthing tool, or any others you have already on hand, if you do not wish to make them specially for this tool. But I advise to use tolerably large ones, at least ¼ inch in diameter, so that the head will take in arbors for setting jewels, etc., to be described hereafter. But the arbors used for hair-spring fitting should be reduced to a diameter of about ⅛ inch for half an inch from each end, so as to penetrate into the smallest places, and also to enable us to bring our false regulator pins near to the centres when wanted. One end should be brought to a fine central point, the other tapered down a little, and the end truly and centrally countersunk. Or two sets of arbors can be made, one fine, the other larger, each having its own horizontal slide and head.

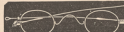
(58) The use of this tool is obvious. Having first fastened the clamp firmly to some part of the movement, the upright rod is inserted with its head at any desired height, and the horizontal slide placed so that the point of its arbor will rest in the balance jewel-hole, when the slides are screwed fast. We reverse the arbor, and bring the other end, which has the female centre, down upon the upper pivot of the balance (or any other piece you are fitting), and hold it upright the same as would be done by the bridge itself. The angle of this female centre should be rather acute, and it should be deeper than it is wide at its mouth, so that it can be raised sufficiently to give the pivot freedom and yet not allow it any play sideways. The surface should be well polished, the head kept clean and free from rust, and it will form a very tolerable substitute for the balance bridge.

(59) This arbor has two hubs, which slide freely upon it, and are each fastened by a set screw. In each of them is fixed a steel wire, ⅛ inch in diameter, pointing horizontally outward from the centre of its hub. Each of these wires has a smaller hub, which slides to and from the arbor, and is fastened by a screw. One of them has two pins, to represent the regulator; the other has a clamp to grasp the spring instead of the tweezers, and therefore represents a stud. This clamp can be either self-setting and spring-tight, or it can be opened and closed by a screw. The pins are made thin, so as not to touch the adjacent coils of the spring, and both the arbor and the regulator pins point vertically downwards, close to the balance, the positions of the stud and regulator in the watch. The wires which carry the two small hubs are filed flat on the top, so that the set screws, which are loosened enough to allow the hubs to slide along, while they

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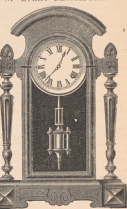
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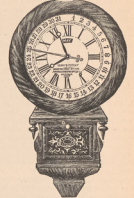


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cannot turn over. If the spring on trial requires to be altered, we simply open the clamp to release it, and raise the arbor, while the balance can be taken out, and after altering can be as readily replaced and refastened, everything being in the same position as before.

(60) In my own tool I also have holes in different places, in any one of which a small plug with a milled head will fit the plug being sawed through the centre so that the two halves spring outward and hold the plug in any position in which it is placed. This plug carries a stiff bristle, and I place it in any hole suitable to the watch so that by turning the milled head with the finger I can lower the end of the bristle upon the balance rim, or raise it, in an instant, for the purpose of holding the balance still or liberating it. I also provide holes for causing a bristle to rest against the balance staff while it is running, should it be desired to make the vibrations small while isochronizing the spring, as hereafter specified.

(61) Now, there may seem to be a good deal of this tool, but it is all perfectly simple and easy to construct, and any man fit to touch a watch ought to make one in half an hour, complete in a day, at the utmost. If he has much work to do it will save him days and weeks of time, to say nothing of the satisfaction in its use, and the superiority of the work. Perfection is not required in any part—the only point at all essential is that the arbor shall stand vertically or satisfactorily in its use, and the superiority of the work. Perfection is not required in any part—the only point at all essential is that the arbor shall stand vertically or satisfactorily in its use, and the superiority of the work. Perfection is not required in any part—the only point at all essential is that the arbor shall stand vertically or satisfactorily in its use, and the superiority of the work.

(62) Our Upright Hor being fastened to the movement so that the point of the arbor rests in the lower balance jewel hole, we select a spring for trial and stick it to the staff according to previous directions, then put the balance into its place in the watch. Reversing the arbor, we bring the end with the female centre down upon the upper pivot, holding it in position so long as it tries to vibrate. The hubs having been previously slipped on the arbor and fastened by their set-screws, we place the hair-spring clamp at the proper distance to grasp the spring, and bring the spring at the point which, before, we held in the tweezers, and fasten the whole properly.

We then place the false regulator pins about as the real ones stand in the watch, and fasten them also. Then we loosen the arbor and turn the whole—the arbor, with its hair-spring clamp, and the pins—all together, and bring the balance in beat, or near enough for the watch to go freely, and fasten it again.

(63) Lastly, we turn the balance a little so that it will start off promptly on being liberated, and lower our bristle upon the rim to hold it so till we are ready to begin, then count the vibrations and proceed as before described (64), except that we now shift the spring in the clamp instead of the tweezers. If the number of the vibrations is about right we pin the spring to the collet (57, 58), and try again, shifting the spring if necessary till the correct number is obtained, then pin it in the stud at the point grasped by the clamp, put the watch together, and a very little regulation will finish the job (53, 75). In this way you will never have to change a spring once pinned in the watch, for it is obvious that it will perform almost exactly the same there as in our Holder, provided the regulator and stud occupied the same relative positions in each. In timing springs before breaking off the superfluous outer coils, the claws grasping the proper coil should be raised sufficiently for them to clear the other coils vibrating below. And, of course, the first trials should be made with a watch vibrating to avoid danger of loosening the spring in the wax.

(64) But if we should get say 250 vibrations with our first spring, when we required 300, instead of sticking other springs on and trying each one in the same way till we find one to suit, as is usually done, we test the strength of our first spring in a hair-spring gauge—Bottum's or any other of the kind described—and examine the rest of our stock of

springs in the gauge, without attaching them to the balance, and find what we want by means of the following Rule: *The forces of two different springs, attached to the same balance, will be in the same proportion to each other as the squares of the numbers of vibrations which each makes.* Supposing that the spring tried gives 250 vibrations, when we want 300, and in the gauge the strength is, say, 20. Then our problem may be stated thus: If a spring which gives 250 vibrations per minute gives 20, what must a spring gauge that will give 300 vibrations?

(65) According to our rule, the square of 250 will be in the same proportion to the square of 300, (the desired number of vibrations,) as 20, the force of our present spring, is to the force of spring which will give 300 vibrations—which is what we want to know. We will therefore represent that unknown force by the letter *A*, during this calculation, and having squared 250 and 300 (i.e. multiplied each into itself), we write the proportion down as follows: 62,500 : 90,000 :: 20 : *A*. Now multiply the two end terms of the proportion together, and the two middle terms left together, and the two products will be equal, according to the law of proportions. Multiplying, we get 62,500 *A* = 1,800,000, and by dividing we find that one *A* is equal to about 28.8, which is the gauge of a spring that will make 300 vibrations per minute; or, to express our process more methodically, *A* = $\frac{1,800,000}{62,500}$ = 29, nearly. As it takes but a moment to lay near the spring on the balance-bridge, and seize it with the tweezers where it lies in the regulator, then test its strength in the gauge, we save all the trouble of attaching the spring to the balance, counting, etc. In fact, we can gauge a number of springs while we would be testing one in the usual way. Of course, any other figures obtained by the workman on each particular case may be substituted for those given above.

(66) Having found among our springs one which gives 29, we have but little more to do, and that has been already described. With a fair stock of springs, it is quite practicable to fit one in an hour, and have the watch passably regulated in one hour. Even the three-quarter watch can be fitted in half the usual time with this tool, and done better, with no risk of injuring it by numerous trial pinning in the collet and so forth, which is almost unavoidable while following the usual methods, as I shall show in my next article, which will be on the isochronism of the hair-spring.

(67) Cases are occasionally found where the tool cannot be used exactly as described, and when it will be required to attach the holder clamp to the balance bridge, place the upper pivot in its hole, and vibrate the balance by hand, counting, etc., as before. But these instances are exceedingly rare, for in most English lever and other under-spring watches the spring can just as well be stuck to the upper pivot for trial, while the balance is placed in the watch for running as usual. And even after the spring is pinned in the collet, that can be stuck on the upper side of the balance with wax, concentric with the pivot, and tested as before described, the balance receiving its motion from the movement, the same as if the watch was finished and going.

(68) A few words about the regulator are necessary, since even its purpose does not seem to be always comprehended. If we could make the ideal perfect regulator, it would be in effect a movable stud, which would allow of being shifted in either direction as the exigencies of the timing should require, and would then become the end of the working portion of the spring, holding it as firmly as the real stud does, and cutting off the part behind it from any influence upon the time of the watch. But since this cannot be practically realized—at least, it has not been done, so far as I know—we should come as near to this ideal as we can, by placing the regulator pins as closely together as possible without binding, on the spring when the regulator is shifted. The most perfect results in time are obtained when the regulator stands pretty well back towards the "slow," i.e., near the stud—and, in fitting in a spring, if it does not give the correct rate, we should move the regulator standing between the middle

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of its scale and the stud, the spring should be drawn further through the stud to shorten it, rather than move the regulator further towards the "fast."

(69) After the watch is put in heat and is fitted for running, we must know if the balance is perfectly in poise, for if it is heavier on one side, it can never give reliable time. The poise cannot be finally tested until now, with most watches, because they generally have an open cut in one side of the collet, making it lighter on that side; and it would be useless to finish the poise till the position of that cut had been fixed, as any turning of the collet for the purpose of putting the watch in heat would bring the cut into a different position and throw the balance out of poise again. The American watch companies have made a valuable improvement by making their collets without any cut, and their watches may be poised as soon as the correct lengths of the spring has been determined. If the balance has movable screws in its rim, the perfecting of the poise may be done by drawing out one of these screws a little. If much correction is needed, two or more screws should be drawn so that their position will be altered but little, and nearly alike. But this mode of correcting the poise is not allowable with a cut balance, as it is adjusted for heat and cold, but only for uncut or unadjusted balances. An open collet should not be permitted with an adjusted compensation balance, but rejected and a solid collet made to fit. This is but a short job.

(70) The rule is to take off the hair-spring and collet to poise the balance, however shows the astonishing number of those who make the "rules" and of those workmen who blindly follow rules so palpably wrong. Notwithstanding that it is taught in "the best shops in Europe," I advise the reader to use his own reason and common sense on this and all other matters, regardless of what "the best workmen" may have practiced from of olden times. There is a great deal of fog in our trade, as in all others, but we should not choose them for our teachers.

(71) It is, of course, desirable that the balance should be in poise before the spring is put on, as that facilitates the final poising. Besides that, the parts then on the staff are considered fixed and permanent, but the collet and roller are movable; therefore the fixed parts as a whole should be poised, and then the movable parts prevented from destroying the poise. Inasmuch as our object is to have the balance in poise while running, it must be plain that the balance should be in poise with everything on it *exactly as it will be when running*. That is, the roller table, the hair-spring and the collet, and all other parts should be on the staff, and if the collet on any other piece is not perfectly poised itself, its final position must be determined before the poising is finished. In chronometers it is customary to drill a hole in the roller-table, opposite the upper jewel and notch, to make up for the metal there cut out and balance its weight; and a similar course will be chrome-plated in fine lever watches. Chronometer collets and springs are adjusted separately. As already stated, the best remedy for an open circular collet is to make a solid one.

(72) There are two kinds of poising tools, the notch and the straight-edge. It is best to do the main portion of the poising upon the notch tool, using the straight-edge for the final tests only as much time will be saved thereby. The poising tool consists simply of two jaws or pieces of hard metal, whose distance apart can be changed to suit the length of the piece being poised. By making suitable notches in a straight-edge tool, you have both kinds in one. The jaws may be of either brass or steel, with the edges perfectly straight, smooth, polished and thin, like two knife blades, parallel to each other and with the edges upwards. At each end of the jaws may be made a pair of notches of pair fine, the other larger. The notch should be about the depth and a little wider than any pivot that is to go in it, the bottom semi-circular in form, and the edges filed very thin so as to enter almost a knife-edge to the pivot, and must be kept clean and polished.

(73) The staff should be so placed in the notches that they will not rub on the shoulders of the pivots. If the balance seems to be correct and does not turn of itself, while it is with a brette, and if it stops with all sides up, indifferently, it may be placed on the straight edges, which should be horizontal so that there will be no tendency for it to turn. It is not necessary to whirl the balance here, but simply place it with different sides up, and if it shows no disposition to change its position it is in poise, for if there is no friction on the pivots to prevent it rolling over it will be the slightest tendency to do so. Whirling the balance will inevitably cause one or the other of the shoulders to bring up against the jaws and necessitate another test. But a well fitted notch leaves little to be desired, or accomplished by the straight edges.

(74) In the tests the hair-spring should be unpinned from the stud, and there should be a preponderance of weight on the side where the outer end of the spring corresponds to the weight of so much of the spring as exceeds the number of coils—that is, the weight of any fractional part of a coil there may be at the outer end, *before or after* the watch is put on the stud when pinned. This may seem unreasonable at first thought, but experience shows that, if the spring is evenly coiled, corresponding to the weight of this fractional end will secure a correct poise when the spring is properly pinned in the stud, and this allowance is easily made either by the straightness of the experienced workman or by hanging an equal length of the spring-wire on the opposite arm of the balance and at an equal distance from the centre. This balancing weight should be very slightly too heavy rather than too light, if exactness is not attainable.

(75) The rule applies only to the plain flat spiral springs, not to the Breguet or the helical spring. Nor does it apply even to the plain spiral when it is unseparated, coiled, or its outer end is so irregularly shaped that the workman cannot judge of the balancing weight or its proper position at the outer end. In such cases, as in the cases, and also when the workman has no spring-wire suitable for the balancing weight, or has not experience enough even to test the balance, the spring should be first tested without the spring and its collet, then with the collet on and the pin in its place in the collet—but without the spring. If any error in the correction should be made in the collet itself, not in the balance, till the collet can be turned in any position without disturbing the poise. This can be done before the spring is fitted, whenever it is seen that the rule given in section (74) is not applicable. The subsequent addition of the spring will not seriously disturb the poise.

Of course, the flat spring can be poised as in (74) before its end is formed into its irregular shape. A helical spring can be poised according to that rule, after the lower terminal curve is formed and pinned in the collet, but before the upper curve is formed, i. e., while the upper end retains its *c* curve. But after both terminal curves are formed the balance cannot be correctly poised with the spring on. It is generally supposed that, the terminal curves are properly formed, the center of gravity of the entire spring will be on the balance center when running. But this is a mistake which I shall show up hereafter; nor can a Breguet spring be poised after the terminal curve, or even the elbow, are formed, except so far as the experience and judgment of the workman may enable him to approximate to probable correctness.

(76) The poise may be tested after the watch is running, by timing it for 3 or 6 hours each in the four vertical positions, *viz.*, with figures XII and VI, III and IX alternately upwards and if the time is the same in the different positions, the balance is supposed to be in poise. See also (85, 93). But in order that this test should be trustworthy it is necessary that the balance jewel holes be well fitted to the pivots, the escapement in perfect order, and the lever poised, so that there may be no variation in the rate of the watch must be wound up an equal distance for each test so that the motive force may

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to the same in each position. Otherwise, errors due to unequal friction or action, imperfect fitting, or lack of isochronism in the spring, may be erroneously ascribed to want of oil in the balance.

(77) I will conclude with a description of my method of timing to seconds. As an error of one second in a minute will amount to 24 minutes in a day, it is important to be as exact as possible in our trials. In the usual method of fitting springs, where the balance is caused to vibrate only by the strength of the spring, constructed by the maker of the balance as it is supported by the stiffness of the spring itself as held in the tweezers, there is no possibility of any accuracy till the spring is actually timed and tried in the watch. But with my tool we may observe correctly from the start.

(78) Passing over those cases already mentioned (33, 36), where no counting or timing is required, but only a comparison of the speeds of two contiguous balances, we will suppose that a spring has been selected, etc. (22 to 36) the balance placed ready for the start, (63) the movement secured in a movement-holder, dial downwards, and we wish to count the vibrations for one minute. For this we need either a watch or regulator whose second-hand makes one revolution in exactly 60 seconds.

If we have such a regulator we take a small hand-mirror or piece of looking-glass, place it beside the movement and at an angle that will reflect the regulator dial with its second-hand, so that we can keep the balance in our eyes plainly enough to count its vibrations while we are watching the second-hand in the mirror. As the second-hand crosses the figure 60 on the dial we raise the mirror and commence counting the vibrations, (36) giving an occasional glance in the mirror, and by watching the second-hand as it approaches the end of the minute, we can very easily tell exactly when the time is up. If we have a watch that can be depended on as correct, we may place its second-hand as near our balance as possible and observe that, as before.

(79) When we wish to test for a longer time than a minute, we dispense with the counting and go by the second-hand, watching it either with the regulator or a watch, and at the exact instant the time of the trial closes we give the pull (50) a twist and bring the bistle down upon the balance. After which we can examine the hands at our leisure. The method of comparing time closely, described by Mr. Fritz in the JEWELLER'S CIRCULAR for January, is an excellent one if the movement is already cased or boxed up, and I have followed it with great satisfaction. I will not repeat his directions here, but refer readers to that number of the CIRCULAR for particulars.

Gems—Scriptional and Secular.

BY DR. E. S. SHELTON MACKENZIE.

Very lately a letter from the Cape of Good Hope, published in an English paper, announced that a black digger in one of the deep gullies in South Africa, had already yielded a great many diamonds and had been abandoned as "used-up," came across the letter writer decidedly, must be regarded as the largest diamond in the world, and that the fortunate discoverer had taken the gem to Europe.

It is only within the last ten years that large quantities of gold were found in Africa.

In the tollsome search for that precious metal, in the subsoil of South Africa, the miners came across glittering stones, which, when examined by jewelers and scientists in Cape Town, were declared to be diamonds.

A great many of these have been taken to Paris, to London—and finally to Amsterdam—where the art of diamond-polishing has long been carried on, and where the artisans have attained wondrous skill in ascertaining the value of precious stones.

As far as I have been able to ascertain, none of the African diamonds have yet been pronounced superior to, or nearly as

good as the numerous and valuable diamonds in the possession of various crowned heads.

I am by no means sanguine in the belief, even the hope, that the mammoth gem discovered in Africa, a few months ago, will astonish all the diamond-fanciers. The African stones hitherto dug up, though undoubtedly diamonds—that is, pure carbon in a more highly crystallized state than coal—have been inferior, either in lustre or purity, to the diamonds obtained from Golconda, Borneo and Malacca, where the mines are all nearly worked out, and even to those found in Brazil.

In Holy Writ there is frequent mention of precious stones—chiefly as the ornaments of royalty and beauty. The favorite mode of wearing them was in rings. These were:

1. The Sardius, or *carneian*, flesh-colored or semi-transparent and hard, sometimes known as sardonix.

2. The Topaz, or *chrysolite*, a straw-colored or wine-colored stone of the silicious species.

3. The Emerald, the *smaragdus* of Scripture, of a beautiful grass-green color, transparent, pellucid and doubly refractive.

4. The Carbuncle, or *onyx*, one of the most beautiful and costly of the red-colored precious stones, and so hard that it is difficult to engrave it. The Garnet, a dark-red red stone, scarcely ever so hard in this country, belongs to this species.

5. The Sapphire, a stone of exquisitely pure blue color, occasionally shading into violet blue, and also not much known among us.

6. The Onyx, supposed to be the *beryl*, of a kind of chalcidolite.

7. The Jacinth, hard, transparent, and usually hyacinthine stone.

8. The Agate, a blending of quartz, chalcedony, carnelian, flint, jasper, and so on, with a great variety of ground colors, with numerous streaks, spots and even figures.

9. The Amethyst, semi-transparent and mostly violet-blue stones, very much worn in rings and brooches, all classes in America, of late years. The darker the hue, the more valuable the gem.

10. The Chrysolite, of a pale-green color, wholly transparent, with double refraction.

11. The Beryl, a pale-green gem, passing at times into water-blue, at other times into yellow, with longitudinal streaks. Sometimes it is found of a clear sea-green.

12. The Jasper, an opaque stone, with alternating colors.

13. The Chalcedony, semi-transparent, sky-blue, with a variety of ground colors, like the agate.

14. The Sardonix, a mixture of the agate and the carnelian.

15. The Chrysoprasus, pale-green and transparent.

16. The Diamond, which is the hardest of all stones.

The moderns are familiar with these gems, and also with others which the ancients were ignorant of.

With scarcely any exception, all descriptions of very large precious stones are to be taken at an enormous discount. Even when a very fine stone does "turn up," it is well to wait until you can "see how it will "turn out."

There is the Koh-i-noor, for instance. The Hindoo tradition is that it was obtained from the mines of Golconda, before the Christian era, and passed into the hands of successive Indian rulers, until, in the fourteenth century, it was placed in the treasury of Delhi by the reigning Sultan, Aladdin, where it remained until Nadir Shah, the Persian conqueror, seeing it flashing in the turban of Mohammed Shah, gaily proposed an exchange of turbans, and bore away the great diamond, to which he gave the title Mountain of Light which it still retains.

Early in the present century it passed into the hands of the ruler of the Panjab; and when the British East India Company annexed that country, in 1849, it was a condition that the Koh-i-noor should be given up, which was done, and then the big diamond passed into the hands of Queen Victoria, who exhibited it in the Crystal Palace, in the Great Exhibition of 1851.

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There, by its side, lays its fac-simile in shape, which exhibited a much greater variety of brilliant hues and lights than the original. So thousands of visitors turned away from it greatly disappointed.

Artificial means were then employed to show off "the real simon-pure." A great many bright lights were artistically placed around it, to develop its many-colored refractions, but this was scarcely a success. It was doubted when afraid to trust the precious diamond in the Great Exhibition, the real stone was not safely retained, in safe custody among the crown jewels in the Tower of London, and two copies in glass shown to the public.

The original weight of the Koh-i-noor was 900 carats. Had it been cut, its value would have been £1,620,000, or, over eight millions of dollars—the variable rule of estimating the value being to square the number of carats the diamond contains and then multiply by £2, the estimated value of a single carat. Thus this process would show: $900 \times 900 \times £2 = £1,620,000$. When the Koh-i-noor passed into the possession of Queen Victoria, it was found that one of its former possessors had it cut, which reduced it to 279 carats, and that a subsequent cutting had brought it down to 180 carats, its weight when on view in the World's Fair, of 1881.

In the following year, it was carefully examined by experienced diamond-cutters from Amsterdam, who declared that a large portion of it was waste, which might reduce its value. So it was recut, which reduced its weight to 123 carats. According to the rule given above, the present value of the Koh-i-noor would be only one-fourth of the price set upon it in England.

That rule gives $123 \times 123 \times £2 = £30,258$ about \$150,000; but the English over-appraise it, at £120,000. In point of fact, instead of being one of the largest gems in the world, and worth two or three millions sterling, its actual value is about 200,000, and cut down in size as it has been, there are many well-known gems of the same species, much larger than it.

Therefore, with such an example before us, we may safely declare our incredulity as regards the declaration that the diamond lately found in South Africa, is "the largest in the world."

Exaggeration in these matters is very common. Here is a historical illustration: After the death and canonization of Thomas a Becket, in the twelfth century, it became the fashion to make pilgrimages to his shrine, in Canterbury Cathedral, which thanks to the valuable and numerous gifts of visitors, became one of the richest in the world. The most notable offering, called "The Regale of France," was a large ear-candle, presented by Louis VII, of France. The legend was that Louis, at the last moment was unwilling to part with this precious jewel, but that while he hesitated, the stone of itself leaped out of his ring, and stuck itself firmly into the door of his shrine.

The stone, like those read of in "The Arabian Nights," was said to burn at night like fire. The general belief, through some centuries, was that this famous ear-candle was as large as a hen's egg. Nevertheless, when Henry VIII overthrew and plundered the shrine of a Becket, he had the stone mounted in a ring, which he afterwards wore on his thumb. Gems of the size of hen's eggs are not capable of being worn in either finger or thumb-rings.

The Formation of Diamonds.

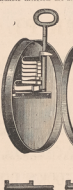
The geographical occurrence of the diamonds of South Africa has been often described but some new points of interest are brought out in a recent paper read before the Geographical Society of London by Professor Mieskowsky and Dr. Flügge. They have found the rock at Du Toit's Pan and other similar diggings to have a soft, decomposed character consisting of a waxy steatolike mass, with a hydrate of bronze, crystals of very vermiculate mineral, called zailite, opaline silica, and non-essential constituents. This rock has been extensively manured and fractured, and in many places broken through by dikes of an igneous diorite. It is asserted that "the diamonds occur more plentifully, if not exclusively," in the neighborhood of these dikes, or near them in the strata of

the igneous rock through which the igneous material has been ejected. In confirmation of this view the writers urge the distinctive character of the diamonds in different localities, and their sharp, unaltered character. How the diamonds have been formed can hardly be explained, though it is a point of considerable interest, if it may be accepted, that the metamorphosed bronze, possibly at places of its contact with carbonaceous shales, was the original home of the diamonds.

Improved Watchmen's Time Detectors.

It is certainly interesting, and to the zoologist perhaps sad, to reflect on the great ingenuity and the number of inventions called out by the depravity of man. The burglar-proof safe, the electric alarm, the check punch, the conductor's punch, and numerous other inventions owe their origin and existence to the necessity of our being on our guard against that portion of our fellow-creatures whose ideas of property and propriety are apt to become confused, and who do not recognize the binding force of the eight commandment. Inventors of this class of apparatus form, as it were, an unorganized "Society for the Prevention of Crime," and on this account are as much entitled to recognition on the part of the public as their confederates, who may be engaged in working out some problem in mechanics, and increasing the application of the motive forces, which modern science has placed under our command and control.

The employment of night watchmen in large industrial establishments, has of necessity, become well nigh an universal practice. But who is to watch these watchmen, to whom exceedingly valuable interests are daily entrusted, for a pe-



riod of from ten to twelve hours? For after all they are but humans, and even if honest, and not disposed to shirk their duties, may succumb to fatigue and sleep, unless stimulated by the consciousness that their movements are observed and recorded with unerring certainty and precision. Answer: Time Detector. On account of the importance of this little instrument, it has been, of late years, the subject of many improvements, all tending to make it as simple and effective as possible, and we invite the attention of our readers to a brief description of the latest of these, as offered by Messrs. Ingham & Co., of this city.

In the watch represented six different keys—Nos. 1 to 6—mark a hole in circles 1, 2, 3, 4, 5, 6, on a paper dial, which is slowly rotating, and other combination keys, Nos. 7 to 12, make a double mark, but in the same circles as before. These marks consist of small holes made in the paper, which is renewed every night, and they are opened by one spring operated by the different keys, while the keys are kept in different parts of the building, to be visited by the watchmen.

These keys are fastened within or outside of the buildings, on the best of the watchman, while the latter, before entering upon his duties in the evening, receives the watch, which is provided with a frock paper dial, wound up and locked. He makes his rounds, and visits the different stations, according to the instructions received from his employer. In making his rounds and arriving at a station, the watchman inserts the key into the hole in the dial, and while doing this, a hole will be pricked in the dial of the watch at exactly the minute hand on the watch shows the time. On delivering the watch in the morning to the person in charge, the latter, on opening the same, can see at a glance how often and when the rounds have been made during the night; whether every station has been visited in the proper order, and whether the watch is of time elapsed between the different visits, etc.—In short, it tells the history of the night's doings of the vigilance or carelessness of the watchman.

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Horological Club Correspondence.

PETER VS. GOING-BARREL WATCHES.
To the Members of the Horological Club:

I fear that your correspondents, whose interesting communications were published last month, did not read my letter on the enormous amount of going-barrel vs. fuzee watches, very carefully. The purpose of that letter was simply to explain the position of "Inquirer," which I might not have understood as he meant to express it. But now I am held responsible for his opinions, and more besides.

First, Mr. Gordon calls me an advocate of the going-barrel, next "Geneva" is astonished that I favor the fuzee, and finally "Inquirer" claims me as an out-and-out advocate of the going-barrel. Now, it is a nice thing to be friendly with everybody, but it is not quite so nice to have both sides scolding you—each charging you with favoring the other. That is too much like the man who undertook to reconcile a husband and wife—they both "went for him," and he had to run for his life. But as I am in for it, I may as well see the thing through, and I will therefore state my real position.

There is much to be said for both sides of this question. Without doubt the fuzee and chain are valuable, and greatly assist in securing isochronal vibrations of the balance. Nor can it be doubted that going-barrel watches have been made to give vibrations as nearly isochronal as the best fuzee watches in the market. But to do this is more difficult in the latter case, because much is required of the hair spring, for which the maker undertakes to furnish the former case. Therefore, theoretically, the fuzee watch has the advantage over the other to the amount of the beneficial service performed by the fuzee and chain—of, of course, if the springs be equally adjusted in each case, each to the utmost possible nicety, the watch which has the advantage below, inasmuch as the springs will have the same advantage at the end. But nothing human is perfect. There is a point beyond which it would be useless to adjust a spring for unavailability. It is a point arising from imperfections in the movement or its usage, would prevent any finer adjustment being perceived in the rate, or if it existed, it is a spring can be isochronized to that extent in a going-barrel watch, then a fuzee watch could give no better practical results, because any superiority it might have would be imperceptible.

Whether a spring in a going-barrel watch can be isochronized to give results which are *practically unimprovable*, as just described, is a question which I leave for professional springers and adjusters to answer. My experience has not been that of a specialist, in any department, but in the general range of watch repairing. But I do know that they can be isochronized very closely indeed. We must not forget that isochronism is a matter of degree, not of kind, and that a spring can be isochronized to steel or to iron, for it must be one way or the other. But we cannot in the same manner say that a spring must be either steel or iron, or isochronal, or not isochronal, for more than we can say that it must be either stiff or not stiff. Some springs have hardly any stiffness, some are stiffer, some very stiff, so that it is with its isochronous qualities. What constitutes a stiff spring, or an isochronal spring, depends altogether on the idea of each individual manufacturer or workman. Some would call a spring isochronal, which others would pronounce entirely unworthy to be so designated. The adjustment of a spring for isochronism is by repeated trial and changes, and it depends as much on the patience of the workman as the adjustment of the balance for heat and cold, or the regulation of the watch for time. The more time and skill are expended on it, the more *nearly* isochronal the spring will be, the more closely will the balance be compensated, or the watch be regulated.

I look upon the question as one of expense—whether hair-springs can be adjusted, with a *reasonable amount of labor*, so that they will give isochronal vibrations in the different areas which a well constructed going-barrel watch will have in

actual use, and with fair treatment? If they can, the going-barrel watch is not only equal to them in some respects superior to the fuzee watch—both being of the same grade of workmanship, for the advantages of its larger balance, fine geared train and quick beat, will then fully offset those of the fuzee and chain. It is more trouble to bring a spring to a certain grade of performance in a going-barrel watch, because it must cover a wider range of difference in the area of vibration than is found in the fuzee watch. If this extra trouble costs too much, then we might better have ourselves of the fuzee and chain. But if those grades of movements containing isochronal springs cost *no more* than the fuzee movements equally good considering the advantages and disadvantages of each kind, we should prefer the former, for many reasons. At present, a mistake mainly a matter of opinion, and must remain so until settled by testing individual watches, and comparing prices in connection with performance as well as quality of execution. So far as my own experience goes, my preference is decidedly for the going-barrel watches of certain makers. But I am quite willing to concede that there may be many equal specimens come to a different opinion from their experience. Every one must form his own conclusions, guided by such experience and light as he may have.

Mr. Gordon understands me to agree with "Inquirer" that watches without the fuzee and chain give as good satisfaction as those with them. That is a mistake. My position is not that they *do*, but that they *can* do so, if properly fitted up. But it we have two watches of the same form, with non-isochronized springs, the one with the fuzee may keep closer time than the other.

The argument of the Fuzeeites is that the theoretical properties of the hair-springs are confined within very narrow limits, and cannot cover so wide a range as the going-barrel watches have, but are barely sufficient to permit of adjusting the springs. In support of this position, Mr. Gordon speaks of a fine English Marine Chronometer, with fuzee, running 50 hours, yet getting 10 minutes slow in 24 hours.

A.M. Now, from Mr. Gordon's evident acquaintance with the subject, he must certainly be aware that the hair-springs of such watches are not perfectly isochronal, and are not intended to be. They are purposely adjusted to make the short gain on the long losses, to provide for slowing of the accumulation of dirt, etc., which will gradually diminish the arcs. The hair-spring not being isochronal is one reason for requiring regular winding. Another is, that even the most perfect timepieces must be treated in the best manner to obtain the best results.

In opposition to this argument of the Fuzeeites, Mr. "Geneva" quotes the Neuchâtel State Observatory Reports, showing that going-barrel watches, under the severest tests, excelled those with fuzees. This is a very strong corrective. But Mr. McFuzee objects that there is no evidence that the two classes of movements were of equal quality. On the contrary, we have the best of evidence that both classes were the best that their respective makers could produce, in the fact that they certainly would not send anything but the best to a public trial, to compete for prizes, and the consequent reputation as makers of the finest-running watches. The presumption is that all watches on trial were the best of their respective classes, and we cannot be asked to believe otherwise without positive evidence to the contrary. Until it is shown that the trials were not fair, we must consider it a fact that they were so, and that going-barrel watches *can* perform as well in every respect as fuzee watches of the same grade.

In my former letter I expressed the opinion that the best judges of the merits of the two classes of watches would be those who have held and used them. But further reflection convinces me otherwise. Here we have a public institution, equipped with all necessary apparatus and convenience of the best modern methods, complete kinds for testing the performance of watches in the most rigid and scientific

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manure, with an Observer thoroughly competent to do so, whose time is given to it; we have a public competition for prizes, and watches sent in to compete for those prizes—a thorough trial, and a full report of the results. If such testimony can be offset by many doubts, unsupported by any facts in the case, so far as known, would it not be useless for individual watchmakers to give their necessarily comparative imperfect and limited experience and opinions, on either side? It seems to me that it would, and that only our Watch Companies and a few of the largest firms of watchmakers could give records that would be received by the trade without question.

Like "Inquirer," I would like to see these questions settled and the matter accepted as facts by the trade at large. But I can see no other way than for our Fuzette friends to show that the Neuchâtel trials are not trustworthy, and to follow up by proving that the limitations of the isochronal adjustment are such as to render the fuzee indispensable for the finest time-keeping, or, that the cost of watches with springs isochronized to give equally good results is greater for those without the fuzee and chain, than with them, grade for grade. If they can establish either of the above points by thorough and scientific treatment of the subject, we must confess that the only reason why the fuzee watches do not take the prize is because their makers do not make them as good as they could do, if they felt disposed. But at present, in my humble judgment, the going barrel party have possession of the field, and it is for the Fuzettes to rush them, or else "own up" the corn, and take down their signs," as "Inquirer" expresses in his last letter, i. e., to abandon their claim, that the going-barrel watch is inherently, and therefore necessarily, inferior to the fuzee watch for practical time-keeping purposes. C. E. FEITZ.

MIL MUNA ON THE FUZZEE QUESTION:

To the Members of the Horological Club:

The "condescension," gentlemen, is all on your side. I consider it both an honor and a profit, to be invited by your honorable body to prove what I have said concerning the advantages which I claim for the fuzee over the going barrel, but allow me to correct a few wrong impressions connected with the fuzee question, because a single word may put me in a bad situation. I did not say that the fuzee doubles the "force" of the going barrel, as inferred from your favorable notice in the peruse of your twenty-first discussion. If you had added: "We mean the force in the last hour of the calculation," the word force would have been right, in this connection. The other thing which I desire to tell you all plainly, is that the motives of the barrel system are justified in claiming isochronal vibrations of the balance, in barrel motors. The isochronal property of the pendulum spring is capable of covering the effect of variable motive force in the adjuster's hands without difficulty, if he is an expert artist in this art. This is admitted. We speak of the elasticity of the spring as being limited, and we may with equal propriety speak of the elasticity of its isochronal property as being limited, but the double extent pressure cannot alter the extent of the vibrations enough to affect it. This is no concession on my part, because I never disputed the claim.

I will now begin to explain one of my three claims contained with this part of the controversy, and which is as isolated from the other two, as isochronism is from compensation. I do not ask your views and time, as that would take away from your attention due to other correspondents; besides, you have not the models necessary to an elucidation of the subject in hand. It is very difficult to analyze this claim, which no body seems either able or willing to admit. It is before the world ever since the publication of my "Third Challenge," and not a single letter have I received concerning it. Now suppose the information contained in that challenge should turn out to be "wholly" wrong, broadest, did it fall among the "stones" of the horological soil, as far as the circulation of the Scientific American carried it? Answer me this question, my friends of the Horological Club, if you can? I can, and will, tell you exactly where the subtle deception lies in: When the adjuster (after many attempts, in some cases) succeeds in making the vibrations of the balance isochronal, in double extent pressure, he is no doubt highly pleased

with the achievement; and, wonders why the English persist in the use of the fuzee and chain, in pocket watches.

It is supposed by not a few of the most prominent chronometer makers in England as well as in America, that as a matter of course the pendulum spring must of necessity be isochronal when the balance makes isochronal vibrations. This is one of the rocks the barrel ship failed to notice. Instead of being isochronal, the spring is damaged by this property for all purposes except for isochronism. It is actually non-isochronal, but is not susceptible of demonstration, only of detection, after the nature of the escapement is known. So far as the chronometer and lever escapements are concerned, the defect is largest where the escapement has most friction, and most decent pressure, and is worse in the lever escapement, per same ability in the adjuster and escapement maker. If the isochronal value of the springs of a hundred of the finest isochronal (auto-isochronal) barrel watches could be tested in the absence of the escapement, it would be found that the above mentioned defect was on the same side if not, and differed only in degree—all the springs lost in the small vibrations. This is as much a necessity as if they were governed by a law of nature; and, I regard it a nice take in, when I consider the time we have expended in the manufacture of pocket chronometers, along with watches for the million. That the English "laugh in their sleeve" all this time that America adopted the toothed barrel system in their highest class work, is clear to me, because it proved to them that we "wisely" adopted the Swiss policy in our factories, namely, cheap production at the expense of principle.

In 1878, I wanted to teach them (the English and the French) pocket chronometer making, they insisted that I was insane; said plainly that "America cannot copy a watch, much less invent one;" that they "had experience in these matters;" that my "discovery was accidental;" that "America should exchange cars for manufacture with England, &c." Pardon this diversion. Whose England found that America had taken this direction, they felt their "present greatness" in this thing, and they are right—they are more the Ulysses, however, than the Achilles, while we are the Ajax. Their sobriety even exceeds that of Ulysses, because whenever they speak incidentally of the advantages of the fuzee, it is in such a desolatory way that we do not profit by it, and all the time no doubt subtly cultivate the "dead" fuzee's acquaintance! This finishes the isochronal claim.

There are, then, two directions in this art, but this article has only to do with the best principles, regardless of the cost—the cheapest in the end—goes down from father to son many times. I will now begin the explanation of the "Economy of Power in the Mainspring;" and is the one I am to "prove" in this present paper. To prove it would require models of both systems, so that I can here only change the stand point of view taken in previous articles. The difficulty comes in where the scale of the escapement is adapted to the ebb of the mainspring's force, in barrel-motors; were it not for this, I think I could explain what I know to be an ugly fact far below the surface. I do not mean that the force motor could grind twice as much cars as the barrel motor, per same tension in same spring. My assertion, therefore, cannot be regarded in a literal sense. I am willing to make the attempt at an explanation, and if the reader can profit by it, it is all right, if not, I cannot help him without models. 1. Imagine both systems calculated for the same number of hours. 2. Imagine both barrels equal in capacity—what one is larger in diameter, the other is higher. 3. Suppose that by some new invention, or magic, the mainsprings were robbed of all their force above the ebb or minimum; in the fuzee as well as in the barrel motor. 4. That the friction is no larger than is necessary in the best hands, &c. Under these circumstances, I assert that the detent pressure is twice as much in the fuzee.

I now come to the third (also pronounced "absurd") claim, namely, that the same escapement lasts twice as long in a fuzee watch, than it does in a barrel motor, when the mainspring in both watches is capable of starting the balance in the lever escapement system, when the motive force is at a minimum, unduly by the momentum of the balance, or motion in the hair-spring stud.

This claim is repeated by the "Spin-Down" theory, when fully carried out by the inventor. In addition to the above "Three Advantages," there are two minor ones, in the fuzee and chain. Its pendant winding girds barrel watches, the stop-work is so great an obstacle to success, in

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the highest class work, in my opinion, that if I were confined to the barrel system in a watch for my own use, I would rather stand the addition of the manufacturing power in the stationary barrel, than stop the wheel's hand in a fine going barrel watch. The other view mentioning is important only in eight-day watches; in the fuzee the stop-work requires no reset while it protects the train to its stationary barrel in the most careful winding that can be used on absent minded occasions. End of claims.

It is easy to see by any one, that for the best pocket chronometer, the best known principles are as necessary as the best artists. Superior result from inferior principles tells the story of superior skill and care, in the execution; equalized friction in the balance pivots, in all positions; the rate of the rate at the end of the winding stragem. The Neuchâtel results, mentioned by "Geneva," are a case in point.

It is urged by the Anti Fuzeeists, that English fuzee watches are a bore, and that they are no better than American barrel watches. This may be true, but it has nothing whatever to do with the fuzee's capability. The chronometer escapement also is a bore, sometimes, but it is equally the case reversed. Inferior result from superior principles, if we choose to use it, we can; but, it is not necessary. The fuzee is a "venerable and patient relic of the antique," truly, and when we get on down into its unimproving qualities, we can make good fuzee watches, as well as "bad" ones, by its adoption; see "Geneva's" production, which did not stop when he was done, as editors are apt to charge.

Conclusion: I do not expect that this contribution will be favorably received, but I want it on record for the future more than for the present, and shall not reply to criticisms, unless they which case, I ought to be the most interested should happen to be just and to the point; in reply. In connection with the above explanation of the qualifying theory, chronometer is easily brought in sight, and its value studied. Whatever unliking resistance amounts to, according to the merit of the invention, must be subtracted from the "ebb," or lowest point in the calculation we want to know the scale of self-returned lever escapement. End of chronometer. The fuzee must not alter the scale of the watch, which are adapted in their rubbing surfaces, from long use to compare with barrel watches that are not so adapted in all the centers existing in a train. The normal friction is doubled by adaptation, and in the fuzee arbor pivots more than one degree in the fuzee should one party be so easily outwitted, by the other?

J. MEKE.

JOHN HULL STANDS UP FOR THE FUZZE.

President of the Horological Club.

I have been greatly astonished at your attitude in this controversy about the fuzee and chain. That such an eminent body of watchmakers should even question the surpassing merits of the fuzee is indeed surprising in this day and age of the world. If there is any one fact unalterably settled and acknowledged by all good workmen, it is that the fuzee is indispensable for the finest time-keeping. I can only account for your course by supposing that you feel it your duty to treat all your correspondents with courtesy. But gentlemen, I feel it my duty to give them a little good advice. With your permission I will do so.

As for Mr. Gordon, he is perfectly correct. He says the fuzee is indispensable for fine time-keeping, and it is so. He has hit the nail right on the head. He writes like a true, thorough-bred Englishman, and I would take any odds that he is one. If all watchmakers over here were as well informed and sensible as Mr. Gordon, we should never have had this disgraceful controversy. But I am sorry to see that he is almost alone, and hasten to his support.

The party who is writing on the hair-spring under the name of "Excelsior," seems to understand his title. I will wager two to one that he is an Englishman. When he comes to write on isochronism I call on him to stand up for the fuzee like a man, and knock this new fangled nonsense about going-quizzism watches keeping perfect time in the head. They can't be isochronized in any how.

That other party that calls himself "Geneva," brings up the Neuchâtel trials as if they settled the whole thing. Why, they don't amount to anything—regular sell, you know—just put up to make a market for the blatted Swiss rattle boxes. Everybody in England knows that.

That Mr. Fritz is a rather sensible sort of party. I have read several of his papers, and am very much surprised to see that he is inclined to abandon the fuzee. From the way he writes I should say he was an Englishman, but had lived so long in this benighted country he has got led away from the true faith. His name is not English, but that may be "put on" like the rest of them. But he is no Yank—I'll bet on that. He don't go howling along determined to see but one side of the question, and coming that up and the other down, like some of those other parties. He looks calmly at both sides and then makes up his mind. That is the way an Englishman always does. So might every other man that is a man. He will see the error of his ways, and come out for the fuzee, yet. I'll bet on that.

He says if a hair-spring can be isochronized perfectly in a going-rimmet watch, it is as good as a fuzee watch. So it would, but it can't be done, Sir. I have tried it myself, and I ought to know. What a thorough-bred English watchmaker can't do, can't be done by anybody. You may depend on that. And that proves that the fuzee watch is and always must be the best kind of watch that can be made. Why, my dear fellow, I would just like to meet you over in England and take you around to some of our big watchmakers. We would soon convince you that these going-cidium things can't keep any sort of decent time. It is impossible, in the very nature of things. Why, every apprentice in England knows that the fuzee is indispensable for fine time-keeping. That is the beauty of being properly instructed. But over here the watchmakers seldom learn their trade thoroughly. Don't have a chance, you know, good workmen are so scarce. So they can't tell what is right or what is wrong, and get led away with going-fuzzilums, and other humbugs, and never find out their mistake till some thorough-bred English workmen come along and explains the fuzee to them. The Americans mean well enough, you know, good clever fellows—sharp as a trade, and all such—but they have not had the advantages we have in England. That's what's the matter. If they only had a chance, I dare say they might make as good workmen as anybody. But as it is, they cannot judge of the merits of the fuzee. Who can? Why, the people that invented the fuzee and have made them ever since for all the rest of the world—the English people. I claim the honor, gentlemen of the Club, of being an Englishman, and therefore competent to speak on this subject. And I do assure you, solemnly, on my honor as an Englishman, that the fuzee is absolutely indispensable for fine time-keeping. There can be no doubt about that. There is no doubt in any thoroughly educated mind that has enjoyed such advantages as we have in England. And I do hope, gentlemen, that you will not tolerate any more such unprincipled trifling with the established maxims and fundamental truths of our trade. It unsettles the convictions of the young, and misleads the workman who has not had proper advantages. I trust that your consciences and honors as gentlemen and christians will show you the wickedness of such a course.

As for that party that calls himself "Inquirer," he might be in better business than misleading those who have not enjoyed proper advantages. If he had asked me about it in the first place, I could have told him how it was, and saved all this trouble. But that is the way with these half-cooked workmen. They are always making a great fuss about nothing. If they were only trained up and educated and instructed like English workmen, they would know better. You never hear of any such ridiculous performances over in our country. An English watchmaker always knows what he is talking about. If "Inquirer" would learn his trade thoroughly, as I have, he would not have to inquire so much, and would not be exposing his ignorance to the whole world and making a laughing stock of himself. Hoping these few remarks may do some good, I remain, gentlemen, yours for the fuzee, J. B.

Communications continued on page 163.

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weakness, wickedness or misfortune of any one person. The law is founded on the theory that it is right for society to interfere somewhat with individual rights when the good of the community demands it. In other words, it protects the interests of the mass in the case of the minority, and, it may be, despite the wishes or the protest of the minority.

In fact, the present law recognizes three parties in a bankruptcy—the bankrupt, the controlling majority of the creditors, and the individual or minority creditor, and it compels the latter to waive his rights and bow to the agreement of the majority. It can have no other meaning; it is tyrannized over for what the law considers the good of all and therefore, ultimately, his good. Any bankruptcy law, so far as it is despotic, in compelling the individual, or doing it for him if he won't, to accept for \$100 when he gets only \$50 cents.

The first question in such a law, whether it is a just one, is whether the creditors which is entrusted with this despotic power. The present law requires one-fourth the creditors and one-third the indebtedness to force involuntary liquidation, and the majority creditor is the usual method under this act—on the consent of two-thirds the creditors and one half the indebtedness; and the majority creditor is the usual method under this act—on the consent of one-fourth the creditors and one-third of the indebtedness, except the assets of the bankrupt amount to only 50 per cent. of his liabilities. Whether these proportions are sufficiently large, is a question upon which there is and must be considerable difference of opinion. A law in which they are larger is thought to work hardship to the honest bankrupt, while the limit of thirty per cent. is sufficient to put a stop to bankruptcy being the fashion among men who willingly or carelessly incur debts for which they have no means of payment.

But what we wish to point out is that any bankruptcy law, fairly framed, must do the honest work well, or it will according to the public opinion and sentiment behind it. If the creditors are easy-going, careless or unpractical, the honest work of a bankrupt's honesty or too-ready to "let him up easy" in composition, rascals will get off on this or any other law when they can find a creditor who will do so. No law will work unless men work with it. On the other hand, the present law requires so considerable a proportion of the creditors to consent, that it is a safe step and gives such full opportunity of protest to any creditor in the minority, that any creditor can virtually stop either negligent or unwise proceedings, provided the judge is also reasonable and fair.

Now even in the case where a fourth of the creditors numerically are made sufficient for consent, it must be remembered that when public opinion is outspoken and unfeeling, even so small a proportion would not dare either to force into bankruptcy proceedings, or to force a creditor to justice or common sense. The judge himself unwittingly relays the tone of the community and is lax or rigid in his administration of law as it applies to the general business sentiment. When public opinion is what it should be, then no honest bankruptcies must and will be rare.

The recent important question in a bankruptcy law is what loopholes are left for the concealment of property. We believe there are few complaints against the present law on this point. In this respect, though there are many criticisms of its "workings." In case of any withholding, transfer or other evasion, the proceedings can be arrested, and a discharge a further limit of two years is given after discharge, during which any creditor may submit proof of fraud and re-open the case.

The discharge is void under any such circumstances, and when the bankrupt is entirely or passively concerned in any kind of fraud, the oath for discharge is so strongly drawn that he is made liable for perjury and punishable to the extent of three years' imprisonment with hard labor. These provisions seem to cover fully the possibilities of any kind of fraud in the proceedings. The chief points on which we should be disposed to call the law in to question is whether it might not be

wisely made more stringent as to the transfer of property or securing of debts prior to the precipitation of bankruptcy. The period of which the law takes cognizance does not exceed six months, and it is quite possible that a bankrupt may be virtually planned long before. To this important question we must refer hereafter, but it may here be said that this matter also is, to some extent, within the reach of the law.

In fact, the objections which we have heard and which every business man bears made against the law really concern not the law itself, but the character of the creditors, and we may add, the business community at large, and not the law, who are to blame in nine cases out of ten where bankruptcies improve each year. Take the case of a Chicago bankrupt, who failed for \$40,000, bought in at \$12,000, the thirty per cent., and immediately is given full credit by New York houses. His discharge was the fault either of too easy creditors or of a too easy judge, and the fact that he obtained fresh credit at once shows the virtual planlessness of the law. So long as the commercial community looks upon bankruptcy as a matter of course, so long as it considers it otherwise than as a stain upon the reputation of the man, so long as it is wiped out by hard work, so long as the bankruptcy law will be found fault with by the very men who are chiefly responsible for its ill-working, another and another measure to improve upon the commercial community the importance of accountability and character and of the public sentiment that promotes them.

"Ready References."

We cannot say that we are always just as sorry as you are that you are too easy business men are caught by their own carelessness, we may say through practices against which we have long warned you. The remedy, we must confess, is rather hard-hearted just now, when some of our brethren have come to grief by their sweet and universal trust in human nature, but it is a necessary evil, and they ought to sit on the stool of repentance for a while.

The daily papers have recently made prominent the case of one of our best and most active buyers in the country on behalf of protesting principals in Mexico. This person's record was by no means clear, nor his previous credit in the community was not so good as he was. He had been trusted by leading firms, otherwise excellent business men, to the amount of over \$20,000. He had a few good references, and his earlier and smaller bills were promptly paid. By these little devices, several prominent houses permitted themselves to be victimized, while others more cautious, tried him the balances and found him wanting—decidedly. One house satisfied itself by offering him gold goods for cash at a discount against below cost, when he had no cash, and was saying "No, no, no, I want to buy on time."

It is the easiest thing in the world, and now-days the most common thing, for a man to get a good reference, pay his bills promptly and thus obtain references with which to victimize others. They understand the philosophy of the man who has done this, and they are not likely to be wanted it but that he might pay it back promptly. This particular gentleman played his cards very prettily with a Providence house, and he had a bill of over \$1,000. It was a thirty day account, but the seller asked for part cash and promptly received a check for the whole amount. His good references, and his generosity ought to be regarded with suspicion, but the Providence house doubtless assisted the swindler by advertising what good faith he was far and wide.

The whole difficulty is in a nutshell: our merchants are too ready both to give and to accept references. A merchant has no right to allow himself to be made an accomplice in swindling another by giving references except to people whom he knows by long tried experience. In England it is held that a man who gives another a reference, and a man who gives another a "character" is held responsible for what he says of him. If he turns out a swindler,

it is left as such a disgrace by his reference that he commonly stands ready to make up the loss. This is a characteristically solid English view of business respectability, perhaps extreme, but it would be better than we have near it here. No merchant should give a reference except he knows the man, and on the other hand no one should give credit on any one reference, or on any other matter as they are so easily given now.

A Business Vice.

There are a good many people who think the proverb "Honesty is the best policy," more than a truism. They are "make shrewdness," as they call it, come. But the merchants who are prominent to-day will tell the young folks a different story. His word is as good as his bond—the reputation by which most of them have earned their position and their wealth. The trickster flashes in the pan, and makes a good deal more show of it, but it is the steadily honest man who becomes steadily prosperous. The Jim Fisks don't last rich long, as a rule.

It is worth while occasionally to call this fact to the attention of business men. There are some who believe "white lies" necessary in business that it becomes imperative to tell the truth to the men who have made the best success made it by these means or by earning a reputation for character. This little business vice, almost all the way down, to the retailer who stands behind the counter and sends everything "to our own manufactory, sir!" In comes a customer with watch which needs mending or other work. "Ah, yes," we'll send it right up to our watch shop!" Another has this or that to be done, and the retailer, who must send perhaps to half a dozen different places for the work of any one day to be done, will send it to "our own repair shop," or "our own patent establishment," until by and by his customers begin to laugh at him, and then he tells the truth, and then he tries to sell them goods. This is the worst reputation a man in any business can give himself, and most of all in the jewelry trade.

There is a good story in the trade of how one of these people nicely over-rended himself. A customer was looking for goods and then he told the dealer that he was a dealer was a local agent. He exhibited these very goods, but on being asked by whom they were made, they proved "of the Jewels of America." The customer went off and bought somewhere else. And it served him right. Truth is the best trademark for a man, after all.

A Loss to the Trade.

It is with great regret that we announce the retirement from the trade of Mr. Henry Olmsted, of the firm of Taylor, Olmsted & Taylor, one of the best known and oldest family goods houses in the city. Mr. Olmsted has been in the business, we may say, for more than thirty years, and has been in the firm in which his ability made him a partner. He is known as a merchant of the best type, and his personal character has done much to give the firm an ever-growing reputation it has earned for itself. Always thoroughly safe and conservative in his business views, yet not without the enterprise and vision of a man of competition a merchant so needs, with a high and ever-present sense of business honor and a jealous reliance on commercial integrity, it is not surprising that he was one of the early promoters of the Jewelers' Association. We print his letter of resignation from that body which owes much to him:

HOT SPRINGS, Bath Co., Va.,

S. W. HALL, Esq., Chairman, etc.

Dear Sir—Impelled by a regard for my health, I have reluctantly concluded to resign my position as a member of the Jewelers' Association, and therefore find it my duty to tender, as I do through you, to the New England Association, my resignation. I am, however, as I thought you kindly conferred upon me at the meeting of October last, the honor of being

It has been a pleasure to me to serve the Association during the few months that have intervened

ed, and it is with great regret that I now find it necessary to sever the connection so recently formed, which I have already feared it to appear as an honorable and profitable connection, however temporary. And in this I am fully sustained by the opinion of the gentlemen who are members of the New York Jewelers' Association, I beg to assure them, one and all of my hearty sympathy in, and best wishes for the object and success of the organization.

Very truly yours,
H. OLIMSTED.

Mr. Olmsted has been a great sufferer from rheumatism for many years and now seeks, by the advice of his physician, the Hot Springs of Virginia. The best wishes of the trade will follow him wherever he goes. It cannot afford to lose such men often.

Editorial Jottings.

There has just been brought out a new style of jewelry, which is very lovely and very effective. It is carved out of the pink shell from which those pink combs that used to be the delight of our mothers and grandmothers. Set in a rim of dry gold, their appearance used to be more suggestive of scented soap than of any thing very artistic or precious. But the skill of the carver, joined to the exquisite tints of the material, has resulted in ornaments of the greatest beauty. The styles are precisely those adopted for coral jewelry, namely, sprays of flowers and leaves, groups of birds and flowers in high relief. Nothing can possibly be imagined more beautiful than the coloring of this new jewelry, shading from the most vivid yet delicate rose-color to purest white, exquisite in tint as the petals of the petals of rose or the sun-flushed snow of an Alpine peak rising against a summer sunset. Pink coral has a yellowish tint, but this new material might be conceived of as petal-rose-leaves for purity and delicacy of hue. But unfortunately, the fine workmanship and the beauty of the material make this new jewelry almost as costly as coral.

The dignitaries of the Horological Club are giving a lively time of it just now, and are getting into a going barrel of snuffing away on the fuzee, at a great rate. This controversy serves the trade about as the tariff discussion affects the general public—a sort of red rag equally enervating to bulls and bears. We wish it distinctly understood that we express no opinion on the subject; discretion is sometimes the better part of valor, and we have equal objection to being broken on the barrel or hung by Judge Lynch with a fuzee chain. But the horologists are perfectly safe in print, however they rage and tear about this building at their meetings—and we advise our readers to pay careful attention to their debates, thanking their stars that they escape being present at these dangerous combats.

As the time approaches for the opening of the great centennial anniversary, the word "centennial" becomes more and more familiar and popular in the public mind; and hence it has become a favorite stamp for trade goods of almost every description. It may be interesting to those who have gone to the expense of obtaining designs in which the word "centennial" is made the foundation, to know that their patents are worthless and cannot stand in law. In the case of Harbell & Co. they are court held that the word "centennial" could not be appropriated by any person exclusively, such a course would tend to impoverish the English language.

The second number of the English trade paper, *The Watchmaker, Jeweler and Silversmith*, is at hand, and pays us a compliment for which we extend thanks. A good part of its miscellaneous articles are instalments from papers in the JEWELER'S CIRCULAR, which we award to their credit, if not to ours. We admire the scissoring of our cotemporary, though it does forget to make acknowledgement, and cannot but say it is at hand, and pays us a compliment promising friend. Its second number is a considerable improvement on the first, and has many illustrations and a number of good articles which are not ours.

The jewelers of New Haven have petitioned the legislature to provide against the present abuse of the pawnbrokers system. As a general rule, these money lenders are a grasping, heartless set of harpies who prey upon the necessitous classes, and any movement whereby they may be made amenable to stringent law is most heartily to be favored.

We are glad to learn that the well-known firm of Field & Co., No. 8 Maiden Lane, have secured the services of Mr. W. D. Cable, one of the most popular travelers on the road. We congratulate Messrs. Field & Co., on having so able a representative, and trust that our friend Cable's success will be as great as it is deserving.

At a recent meeting of the New York Jewelers' Association Mr. F. D. Taylor, of Taylor, Olmsted & Taylor, was unanimously elected Treasurer, to serve the unexpired term of Mr. H. Olmsted, resigned.

Trade Cossip.

Population of New York, 1875, 1,064,272. Horn jewelry in imitation of tortoise shell is having quite a run.

Pierre Benoit or Banghe, is the name given to the latest alloy in bracelets.

Cornelian jewelry is all the rage with the girls since Cornet was the regatta.

The demand for fine cane goods of the Antique and Egyptian designers, is increasing.

Many Mexican necklaces are made with English, French and German cheap jewelry.

Faint jewelry still continues popular, notwithstanding the quantity of cheap gilt stuff sold in the dollar stores.

The Howard Clock Co. have been awarded the contract for furnishing the new clock for the Tribune Tower.

Mr. H. Walker, of Notre Dame St., Montreal, has sold a cabinet of a box containing \$12,000 worth of diamonds.

Ladies' hair combs made of emmental ivory are the very much sought after, they are about as costly as tortoise shell.

The mock antique jewelry stores are doing a thriving business, and are to be found in all the principal business streets in the city.

James Henry and John Hall have been arrested for smuggling \$20,000 worth of diamonds, having recently added to their list a new movement named "Hairs," it is giving great satisfaction wherever introduced.

Jewelry carved out of pink cameo shell, in styles adopted for coral jewelry, namely sprays of flowers and leaves in high relief, is exceedingly beautiful and very fashionable.

The latest novelty in travelling clocks is called the St. Nicholas Time Piece, it is a marvel of cheapness, accuracy and beauty, and is introduced by the American Clock Company.

A. S. Brooks, a watchmaker in the employ of Hamble & Coles, while under the influence of liquor, was kidnapped and enlisted in the army. He didn't want to serve time in that capacity.

The parure of sangail Peruvian diamonds stored by Special Treasury Agent Brackett from R. Binkman, a passenger in the Colon from Apinaw, have been appraised by the Government experts at \$2,200.

Quebec has got a new observatory, and the party in charge drops a time ball every day at noon, giving the ships in the river an opportunity to raise their chronometers. *Histoire de la science* must be to depend on the factory whistles.

Salomon Leveque, a New Rochelle jeweler, has been accused on the charge of tampering with a diamond ring entrusted to his keeping. It is a very serious charge, and he is charged with the possession of the genuine stones for \$500, and substituted imitations.

A novelty in costume is a fan, the handle of which forms a pocket-handkerchief holder. Some fans have also a tiny seat-bottle inserted at the bottom of the fan-handle. And this a fan becomes handkerchief, scent-bottle, and fan in one.

An astronomical regulation of time, called the "solar clock" is soon to be established at the Observatory in Paris, with conductors connecting it with the Bourse, the banks, the Hotel de Ville and other places, to secure an exact uniformity of time throughout the city.

The *Neue Deutsche Gewerbe Zeitung* states that 1,600,000 watches were made in Switzerland last year. It is the largest number of watches and the greatest number of ordinary watches, producing, in round numbers, 500,000,000 francs. The canton of Geneva produces annually 150,000, mostly of elegant manufacture.

The *Electro Trade Journal* states that a very ingenious application of electro-metallurgy has recently been brought before the notice of the Society of Arts. It consists in the application of a coat of silver, by means of electro-deposition, on natural leaves and flowers. By this means very delicate ornaments are produced, since the precise form and texture of the natural leaf is very much enhanced. The process is a simple one, and the results are attained by the invention of a Mr. Denton.

Le Boutillier & Bride, IMPORTERS,

10 Maiden Lane, N. Y.

NEW IMPORTATIONS OF

FRENCH CLOCKS,

BRONZES, MUSICAL BOXES,

—AND—

RICH FANCY GOODS.

We are now prepared to submit to OUT OF TOWN CUSTOMERS Photographs of our Goods, in order to give dealers the advantage of seeing and ordering the latest designs. These Photographs will give the exact measurement and prices.

Applicants unknown to us will please give city references.

FORMERLY

Shepard, Le Boutillier & Co.

CRYSTAL CHANDELIERS

GILT, BRONZE & DECORATED GAS FIXTURES,

Fine Marble & Bronze

CLOCKS,

Bronze Figures and Ornaments in Greatest Variety, at Low Prices, Manufactured by

Mitchell, Vance & Co.

No. 597 BROADWAY NEW YORK.

"Medal of Special Award" by American Institute, 1872,

No. 719 GAS FIXTURES.

MITCHELL, VANCE & CO., 597 Broadway, N. Y.

We find the above-named Fixtures and Glass Chandeliers, for design, excellence of workmanship and finish in all their parts, to be the best production in the country and we may say, in our judgment, excelled by no other country in the world.

We recommend a MEDAL OF SPECIAL AWARD for CHANDELIERS and GAS FIXTURES.

"Medal of Special Award confirmed." (Signed) JOHN W. CHAMBERLAIN, Secretary.

C. F. A. HINRICHS,

29, 31 and 33 PARK PLACE,

Cor. of CHURCH STREET, (Up-stairs) NEW YORK
Successor to M. WERCKMEISTER.

IMPORTER AND DEALER IN

FANCY GOODS,

Glass Ware, China, Bronzes, Clocks, Toys, &c.

Sole Agents for the GLASS FACTORIES of the COMPANY "ANN," Namur, Belgium

Depot for ARCHERY, CRICKET and BASE BALL IMPLEMENTS

And for C. A. KLEMMANN'S CELEBRATED GERMAN STUDY LAMPS.

Agents for ROGEE'S GROUPS in Paris, &c.

Price Lists sent on application.

Goods imported to order.

PROCEEDINGS OF

THE HOROLOGICAL CLUB.

A Distinguished Body of Watch and Clock Makers.

Twenty-second Discursion Communicated by the Secretary.

ANNOU NCEMENT

It will be gratifying to the numerous friends and members of the Horological Club, to learn of the dismissal of the over zealous police officials who so unwarrantably interfered with the progress of their deliberations last month. This action was not solicited by any member of their Honorable Body, and on that account the dismissal is more gratifying to them. It will be remembered that the offences of these police officers were of the most aggravated nature. They not only mistook their Honorable Body for midnight conspirators, but they had also the audacity to designate their Headquarters. It is presumed that these ex-officials will now understand the difference which exists between a Horticultural and a Horological Society.

GOING-BARREL VS. FUZZE WATCHES.

Another communication from Mr. Fritz on the fuzze and going-barrel controversy was the first business brought up for consideration. During the reading of this half of the time the Fuzzeite party were quite jubilant, as they felt sure that Mr. Fritz was coming round, and would openly declare himself a Fuzzeite before his paper was finished. This, however, proved to be a short lived delusion on their part, for after Mr. Fritz had exhausted nearly all the arguments for and against the fuzze he came to the conclusion that a fuzze was altogether unnecessary in a modern watch, and then the Anti-Fuzzeites became the jubilant party. Mr. Fritz's remarks upon the Fuzzeite party were so "corn" gave the Anti-Fuzzeites great satisfaction, but the Fuzzeites declared that if that operation or any other signifying device which ever to the credit of the Fuzzeites had to do it themselves. Every Fuzzeite was fully resolved that this should be the case, and their numbers are most numerous throughout the country.

Mr. McFuzze desired a more a few criticisms on Mr. Fritz's communication. It appeared to him that that upon the whole party to go over the ground was more like boring the understanding than convincing it. They had no proof whatever that a going-barrel did the same work as a fuzze. They might consider this a bold statement for him to make after so much had been said in favor of the going-barrel, but while he said so he was not to be supposed to be uttering the judgment, or impeaching the veracity of those who had different ideas. He declared that in his opinion it was a mechanical, as well as a philosophical impossibility, for a watch without a fuzze to run as well as one which had that necessary appendage. When we analyze the impelling and controlling forces in a watch, and observe the necessity which exists for the opposing forces to be as nearly balanced as possible and kept in the same relation the one to the other, we can at once see the necessity for a fuzze as a regular performer in the watch as an object. He did not deny that going-barrel watches had often performed remarkably well, but in addition to skillful manipulation this was greatly due to accident. A going-barrel watch did not hold its rate so well as a fuzze watch of the same grade. When closely observed it "womped back" and forward in a most erratic manner and could not be depended upon to run the same two months in succession. He did not deny that fuzze watches were not so liable to a sudden change of rate, but the liability to change was not so great, because the opposing forces which were at work in the fuzze watch were more uniformly balanced.

Referring to the Neuchâtel trials, Mr. McFuzze was afraid that Mr. Fritz had misinterpreted the remarks he had made concerning them. He did not say there was anything that bore the faintest resemblance to incapacity or fraud in conducting these trials. Neither had he

any suspicion but what every competitor sent the very best watch he could produce. What he said was to the effect that they had no evidence that the going-barrel and fuzze watches were the same in every respect, and that the trials were of too short duration to prove the relative advantages of both systems. It was only common sense to suppose, that if a going-barrel and a fuzze watch were placed in competition, that the balance and the escapement of the two watches should be the same as near as the human senses could determine. That the balance springs should be of the same construction and the balance of the fork and roller action be the same, the length of the lever, and the arrangement of the escapement all the same, as well as the number of vibrations, and the general arrangement and execution of the train up to the centre wheel. Unless there was evidence that all these details were as nearly alike as possible, the Neuchâtel trials prove nothing. They must show which was the best running watch during the period the trials lasted, but they proving nothing at all regarding the comparative advantages of the fuzze and going-barrel.

Mr. McFuzze was sorry to see that Mr. Fritz had changed his ground regarding the ability of watch makers to construct the same best running watches, and also mistrust the facilities they had for doing so. Without any disrespect to the Neuchâtel Observatory, which is a very fair institution, he contended that there were no persons who could form a better opinion regarding the running of watches in general, or the ability of constructing watchmakers at the head of large watch repairing businesses. So far as the running of watches were concerned, he ventured to assert that the best fifty watchmakers in the United States who were equally capable of judging, as the Director of any Observatory, was the Fuzzeite Association, and the Fuzzeites were now scattered all over the country in great numbers. Their owners had considerable experience in using them, and for all the purposes of testing by celestial observations, or for running of chronometers and watches, they had given general satisfaction. Mr. McFuzze then apologized for the length of his remarks. He said the subject was so important, and was one he had a deep interest in, and although there were other points he might consider, he did not desire to monopolize any more of their time at the present meeting.

Mr. Clerkenwell then rose and said that he wondered if Mr. Fritz, when testing his balance by practical trials, would choose a going-barrel in preference to a fuzze movement to do so. As nobody present could answer this question, it was thought that Mr. Fritz might do so himself when convenient.

An argument in favor of the fuzze, received from Mr. Muma, was then read, and after the paper was completed the communication was passed round to the enable members to see it for themselves. The Fuzzeites were unanimous in their opinion that the subject was of the greatest importance to their side of the discussion, although some members who were familiar with Mr. Muma's writings, considered that he had done so strongly on some points as he had done on previous occasions. A vote of thanks to Mr. Muma was then proposed.

Mr. McFuzze, in responding to the motion for a vote of thanks, took occasion to eulogize Mr. Muma's writings in general. They were usually of a very deep character, and he was always understood to be of the superficial kind. He had an original style of expressing himself, and was bold and fearless in his utterances, and very often told truths which excited the anger of his hearers. The vote of thanks was then carried with acclamation.

"John Bull's" defence of the fuzze was not without interest. This communication was of the course considerable matter to both genuine and ironical remarks of approbation were freely indulged in by the members of the Club during the reading.

Mr. Waltham then rose and said that he desired to make a few remarks on the paper just read, and has nearly as can

be remembered spoke as follows:—"It won't do, Johnny! Your arguments lack power. Telling us upon your honor as an Englishman that "going squizzum," "going rictum," and "blasted Swiss rattle box," was not made to make it run as well as fuzze watches is not sufficiently convincing, we want more proof, and you must produce it. Appealing to our consciences and to our common sense and to our christianity against tolerating what you term the unprincipled trifling with the established maxims and fundamental principles of our trade is not strong reasoning, Johnny. You are a young fellow at a glance when you think of the christian maxim of proving all things and holding to that which is good. It is good to be good, Johnny, very good, but you must not use christianity when bulling the fuzze, which you claim to be the inventor and manufacturer yourself. Your manner of disposing of the party who call himself "Inquirer" does not give evidence of many vigor, Johnny. It shows sickening of morality. Claiming "Excelsior," Mr. Fritz, is not a new name, it is an old name, and Englishism, is characteristic of you, Johnny, should the claim not be correct. Neither Excelsior nor Fritz are English names, and would not be so if they were to be an Englishman he will be the first of that name that ever was, although at the same time he may be just as good a British citizen as any other. Your letter is not bold, neither is it pungent. It is a mixture of self laudation, grumbling, and growling. Give us more arguments, and more facts, because facts are as stubborn as John Bull. You say Mr. Waltham's retort to John Bull's growl counted as much amusement as the reading of John Bull's letter did, but it is quite possible that John Bull may yet have his revenge. At this stage the chairman recommended that all further discussion on the fuzze and going barrel question should be suspended, as it was not the matters pressed upon them for consideration which should be attended to.

TRADE SOCIETIES.

The subject of trade societies was next introduced, and the communication received on the subject were freely discussed, but with the space at our disposal it was impossible to publish in detail all the arguments of the body. The chairman considered that all good watchmakers should unite for the purpose of exerting all the money they could from the employment of their own hands. Another party was of the opinion that any such combination would only defeat the object it had in view. They insisted that the main object of trade societies should be mutual intercourse, help and improvement, and as a consequence, substantial benefits would be sure to follow. While there was great difference of opinion on the various views expressed on the subject, their honorable body were unanimous on one point, and that was, that outside of the fuzze, there was not another watch ability, energy, and self sacrifice, which was necessary to establish and maintain a watch and clockmakers' trade society.

TOOLS AND METHODS OF WORKING CLOCK AXES, AND METHODS OF GENERAL WORK.

Mr. Secondhand desired to remark that if watchmakers throughout the country would write to the Club, and inform them of any method of doing any particular job, or concerning the method of making or using any new tool to do the same work wherein it did it better or more cheaply (very better), it would be of great benefit to the trade. The very best of workmen have not all the best ways and improvements, but all want them, and by improving and receiving we will improve, and that of course is the way to success.

For an illustration, a very good workman had an American main-spring barrel was pressed out by the main-spring break. He did not know how to get it back, although he had a tool (a long steel barrel with a taper hole) made to repair the old style of barrel with. I told him to turn the lathe and make a new one out a ring that would just fit over the smooth part of the barrel, and then turn out a wood mandrel on his lathe and turn the new barrel on the mandrel, leaving it a little larger than the teeth on the barrel, then cut through the ring on a slant, and

slip the ring over the barrel and proceed as usual. It was one of the plainest things he did so, and it came out as good as new. He has used it on a number of American and Swiss barrels when the head did not correct.

It was concluded to make it run as a number of them to fit the different sizes. I have no doubt there are many watchmakers who do the same thing, but a larger number who know of it, and about a number of any of any little thing like the above, it would be a great benefit to the profession at large.

The following communication was then read by the secretary:

To the Members of the Horological Club:

DEAR SIR: It is quite extensively practiced by some New York wholesale dealers in jewelry, watch materials, and what-else, when they receive an order from a country customer, if they have not got exactly the goods specified to send the next thing to it thinking no doubt well, "he is a country hoosier and won't know the difference," and if he does, rather than return the goods and incur express charges he may keep them any how, a case of this kind has come under my observation.

About four months ago I purchased two watches from a traveler of our New York watch store, and as they were so cheaply made, I examined the watches and found them to contain several mistakes, and as I was not a watch maker, I had them cheaply corrected while the watches were in the process of construction but not so after they are made. I have two of these watches, and I have two watches (at least so they price list) I returned them to the house purchased from with a full explanation of the defects. In due time I received a letter from the party and here is a copy of it. The letter was very polite, and I returned the watches you returned, I found that your observations were correct. I am very sorry that you just happened to have these two watches, and I have been a mistake or carelessness from the workman, for not only these two but one or two more were also in bad running order and we had to return them, and you may rest assured that such a blunder will not occur again. I hope you will not judge of the watch by the two you had, but will keep your opinion until after examining the two that were returned to me in a few days. Now this letter is dated May 25th, and as it was the 4th inst. I received the two "perfect" watches, and I am very sorry that you and the others of the first purchase but altered and made as good as this one. I examined and found it is the following condition:

The main plate upon the balance bridge is imported from the United States, and is made to raise the bridge, this having raised it too high, the motion of the bridge is lifted to lower the balance, and the balance is raised, and it was too heavy, "that genius" did nearly all the work, and the balance was raised too much, he then put white metal washers on the screws to make the balance heavy again. The upper plate of the balance bridge had the black brushed out of the engraving, and the lower plate of the balance bridge, and the bridge, are scratched and scratched with oil. Now, all this shoemaker work was done to a fine clock movement, a jeweled gold settings, in a New York watch importing house, and this unfortunate watch is styled "adjusted and true, heat, cold, and position," and submitted to my examination.

It is bad enough to misrepresent things and im-

pose on any one, but if wholesale dealers will persist in such practice, it occurs to me that it may be well to consider the matter and their dupes, for not "all" country watchmakers are accidents in the business.

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THE
AMERICAN WATCH COMPANY
OF WALTHAM.

NEW MOVEMENT!

Named A. W. Co.

BROADWAY.



Will fit all American Cases.

The Escapement is jeweled throughout, also jeweled pallets, hardened and tempered hairspring and nickel balance.

The Cheapest American Made Movement ever offered!

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No. 5 Tribune Building, Chicago.

The Marlborough Gems.

The splendid collection of antique and Renaissance engraved gems and cameos, formed by George, third Duke of Marlborough, in the latter part of the last century, and ever since then preserved in the cabinets of Blenheim, have been bought *en bloc* by a wealthy British Connoisseur, for whom Mr. Agnew the well known dealer made a bid of 35,000 guineas.

As a whole, this magnificent collection can be considered as one of the most artistic art, invaluable as a book of reference to all students of art and history. Parted out among the cabinets of the innumerable connoisseurs of the world, they have brought half their interest and all the value to be derived from them as a series in which the varied styles of sculptural art of this nature can be traced or studied from the antique of the Greek and Greco-Roman to that of the Italian Renaissance later work.

The vast importance in art of works of the kind now before us will be seen when it is understood that they contain, so to speak, the very essence of the finest art. The sculptor must be gifted with thought and feeling, and trained as to eye and hand to produce previous centuries of history over the most unyielding and opposite materials. He has to create nature and condense into reduced but perfectly symmetrical proportions some grand form before him, or in his mind's eye. So to epitomize his subject can only be within the power of a master; the mere copyist who reduces to scale would produce but a lame and lifeless image. It would seem that the great antique glypts, as may be observed in many gems in this collection, were as sculptures of their own race as of the beauty they represented, for they cut their names proudly upon the face of the imperishable stone. The names of several of the famous artists of antiquity mentioned by Pliney have been handed down to us in such gems as the celebrated fragment of an onyx intaglio in the Devonshire cabinet, which was purchased by a former Duke of Devonshire for the large sum of 1,000 guineas, representing simply a cow lying down, but bearing the signature of Apollonides, one of the greatest engravers. A ball in the Devonshire cabinet bears the name of 1712 and a beautiful sardonyx cameo of the Amphitrite in the same collection, that of Glycon.

One of the most remarkable and interesting gems in the Marlborough cabinet is a deeply-cut intaglio in a large pale amethyst faced on *cacholong*—i. e., as a caruncle is usually cut—and measuring 12 inches by 11 inches oval, and 1 inch from the flat to the convex surface. The figure is a bust of Pallas, full face, wearing the helmet ornamented with a winged griffin on each side and two rams' or goats' heads, and on the shoulders the scale breastplate with twisted snakes, and the Medusa's head partly concealed by the plume, a fold of which is held by the left hand. It is indeed a noble work, and is considered to be the original of one of the most interesting of antique signed gems. Stosch, who describes an impression he took in wax from an intaglio which in all probability was this identical one, says that the head appears in the highest relief, which is extremely rare, on account of the immense difficulty of the work. Nothing can be more singularly fascinating than this gem, into which one looks as into deep water, to discover a beautiful vision of the storm gods. It is not easy to see this properly, but with some care the figure comes out with wonderful effect. As showing the *finesse* and subtlety of antique art, it is altogether a most interesting and valuable work.

In some respects to be compared with this is the small ring-set gem of the dog star Sirius, cut into a splendid garnet, and taking rank for the richness and finish, almost among the gems of any age. The dog is rudely and open-mouthed in front face, and on his collar is the signature, in minute letters, PAUCIUS RHEIL. This stone is worthy of the art bestowed upon it, being of that rare kind of caruncle (garnet) known as the Strian or Syrian, found near the ancient capital of Pagan. Most of the finest cameos and intaglios are cut in Oriental stones of rare quality, such as are scarcely ever met with in modern commerce. This gem belonged to Lord

Chesterfield, and Natter, the gem-cutter, who described it in his *Traite de la Methode d'engraver de Graver*, acknowledges that he copied it in topaz. Natter's copy is at St. Petersburg, and there are others in different collections, one in the Payne Knight collection in the British Museum, another in the Berlin Museum.

A good specimen of Natter's skill is an intaglio, copied from the original profile of Marcus Junius Brutus, beautifully wrought in sard, but certainly not altogether the head of the coin that has been always received as the portrait of Brutus. It is an expression rather commonplace and meagre; but Natter always held it in great esteem as the original from which all the numerous copies were taken, and it is certainly a fine work of the imperial time. This belonged to the Chesterfield and Bessborough cabinet. Lauriat Natter catalogued Lord Bessborough's collection in 1751. The gems have all been identified with the exception of four, and referred to in the sale catalogue. Before the Bessborough gems were purchased by the Duke of Marlborough, however, he had acquired the Duke of Devonshire's collection, the Lord Arundel who died in 1640, which had passed through the possession of the sixth Duke of Norfolk, to whom Oxford is indebted for one of the finest of the grandeur of the collection. The Duke of Norfolk's son succeeded to them, but, by a strange fate, they passed away from the house of Howard, for they were retained as her property by his divorced Duchess, the Lady Mary Mordaunt, who in 1705 died, five years after the decree for her divorce was passed in the House of Lords, and bequeathed the gems to her husband, Sir John Germain. In 1718 Sir John married his second wife, Lady Elizabeth Berkeley, and left her all his property.

A trustworthy record of the collection at this time exists in a manuscript copy of the catalogue, dated 1727, in the library of the Society of Antiquaries. The "Lady Betty" arrived till 1760, but in October, 1762, Lady Mary Beancher, her niece, was married to Lord Charles Spencer, brother of the third Duke of Marlborough, and as her wedding gift received the gems. The Duke of Devonshire, however, among the gems passed from this Lady Spencer to the Duke, her brother-in-law, who was then enthusiastic in his pursuit of art. And here they have remained at Blenheim till the present time, only known to the public by the etchings of Worlidge, or by the superb work illustrated by Bartolozzi's engravings from Cipriani's drawings of the gems, with descriptions by Jacob Bryant, the accomplished antiquarian, which the Duke in 1788 had printed for presentation to Kings and Princes and to the great public libraries of the Universities of Oxford and Cambridge—a work which was reprinted and published by Mr. John Murray in 1842.

The British Museum was then only thought of, and the Portland Vase had not taken its stand in that curious little octagonal room up stairs in old Montague House, which in all probability was of a century or more ago smashed by a fanatic visitor; but these Marlborough gems, it appears, were offered by Lady Elizabeth to the Duke of Devonshire for a fixed price, and declined. This sum, however, must have been far less than the actual cost of the collection. One other source of this magnificent collection was the cabinet of a Jewish dealer and collector, one Medina, at Leghorn, from whom came 40 gems, some of them very admirable and authentic pieces, and one particularly interesting double nicolo, engraved on both sides, and massively set in gold, with large table diamonds and rubies alternately on either side, and a delicate filigree work of triplets of twisted tied into a sort of fleur-de-lis. On one side is an antique cameo of Omphale, on the reverse a cameo bust of Hercules, of Renaissance work, while the stone itself is perforated heavily with by one of those wonderfully fine drill-holes made by ancient Indian skill, which are found only in the very choicest works. The historical interest attaching to this gem is that it was presented by Charles V. to Pope Clement VII., and by the letter to the Pico di Montemini di Siena.

To be continued.



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OF EVERY DESCRIPTION.

Would call especial attention to the new

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These Pitchers are made of the finest quality of white metal, heavily plated with silver. They are finely engraved and chased in a great variety of decorations. The linings are of fine stone china. The top is secured to the body of the Pitcher in such a manner that can be easily detached and the lining removed for cleaning or other purposes.

Many improvements attained are noticeable in these Pitchers. Water and ice standing in them do not come in contact with any metal whatever. They are perfectly clean, and easily kept so. They are perfectly free from all odor or rust. Lemonade, beer, milk, etc., may be kept cool in and drank from these Pitchers without endangering health. There be nothing cleaner or purer for holding liquids than pure silver. These Pitchers are made in such a manner that the construction of the Pitcher is such that the linings can easily be replaced at a very small cost.

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The newest and most convenient in the market.
ALL CIRCULARS MAILED FREE.



Assaying Gold and Silver.

Continued from June Number.

Now take the decimal solution of salt, and run in 10 grains of solution at a time, warming and shaking the bottle after each application. Suppose the first six grains of precipitate, and the seventh does not, the seventh and half the sixth are not counted. Thus:

Normal solution	1000
Decimal solution	7
	1007
Less	13
	10054

This represents the standard of the normal solution. Now take as much of the alloy to be assayed as will equal 10 grains of pure silver, which must be found out by previous analysis. Dissolve in nitric acid, and run in the normal and standard solutions as before, when, of course, the amount of fineness in the alloy can be easily ascertained by a proportion sum.

OBSERVATIONS ON THE ABOVE METHOD.

Although the above method sounds remarkably easy and simple, and indeed is just a variety of precautions are to be taken.

The nitric acid must be quite pure. The distilled water for the operation ought to be especially kept in clean earthen jars, first water that comes over from the still ought to be used for the ordinary purposes of the laboratory, and the succeeding portion kept in clean earthen jars, well stoppered. The pure silver for the solution is better obtained from dissolving a florin in nitric acid, adding pure water, and when precipitated with hydrochloric acid till no more precipitate forms. Dry the precipitate in a porcelain dish over a sand-bath, and run down the residue with a small quantity of carbonate of soda in a clean crucible. If the greatest exactness is required, dissolve the resulting button again; precipitate and melt again when the silver is perfectly pure.

The best way to arrange the bottle of normal solution of salt is to insert a cork fitted with two glass tubes, one bent in the form of a siphon, and fitted with a long piece of India-rubber tubing reaching nearly down to the bench where you are taking the assays, the bottle having been previously placed on a shelf a foot or two above. A small point tube, like a burette point, is now fitted to the end, and a pinchcock fastened on about three inches above the point. When you want to take a measure of 1000 grains of the solution, place the thumb of the left hand on the outlet of the pipette, placing the fore and middle finger on the shoulder above, thus holding it tight. Now withdraw the thumb of the siphon connected with the bottle, and (having previously well shaken the solution) run a little through the pipette (to clean it) run in gradually in such past the mark on the neck. Let go the pinchcock and remove the point, and place the forefinger of the right hand firmly on the top of the pipette, removing the thumb of the left. Now wipe the pipette with a clean silk handkerchief, and gradually loosen the tightness of the right forefinger, and allow the solution to run down to exactly the mark; immediately introduce the point of the pipette into the assay bottle as far as the shoulder, and let the solution run in. When all the solution has run, lift the pipette out, without shaking the superfluous drops off. It is much better for the operator to do this than to try and get rid of all the lost drops of the solution, as a well-used pipette will drop precisely the same for any number of times following. The pipettes for the decimal solution are much better when made with glass graduations, marked the operator's eye from that usually pursued, viz., with the ten degrees at the bottom, next the point, and the hundredth division at the top. The reason is that, by immersing the pipette in the decimal solution bottle, you can easily take a measure of a tenth, and

let it run out clean into a bottle of alloy, as in the case of the normal solution: whereas in the pipettes marked in the ordinary manner, viz., with the ten degrees at the top and the hundred at the bottom, you have to run out the solution, or a fixed grade; if you let your finger slip, or have not sufficient power, you can very easily run past this grade, and spoil your assay. The last drops from this smaller pipette are best blown into the assay solution with a slight breeze, and not left in the normal pipette. The bottles used for this assay should be well stoppered, and of sufficient size to allow the shoulder of the normal solution bottle to rest there, so as not to wobble about when letting the solution run in. Be careful not to touch the nozzles of the stoppers with your fingers, and always place them, with their ends upwards, on their backs, when removed for the purpose of letting a solution run in. In fact, everything should be kept as clean as possible, so the slightest perspiration will cloud the solution, and very often the acid, or the water, or the test silver is denominated impure, and the fault is in the cleanliness of the assayer. The hands should be well washed with soap and water before commencing this assay, and occasionally wiped on a towel by the operator's side.

After each application of the solution the bottle must be violently shaken, and replaced in the hot water in the saucenap. If the clear water on settling has a bluish tinge, like quinine solution, copper is present; but this does not interfere with the estimation of the cloudiness on the application of the decimal solution. When finished with, the bottles must be well washed with distilled water, and the stoppers replaced. It is best to put them away in a drawer free from dust, &c.

Supposed, then, the assayer has three samples to be determined (and unless he is in a mint he is not likely to have more), he will proceed as follows:

Three bottles, each of the standard, and see that the numbers on the stoppers and shoulders agree; weigh off ten grains of pure silver, and standardize your solution first, as in the case of the standard. If 1000. If the approximate standards of the alloy are not previously known, they must be found out, either by cupelling or by the standard solution. Cupelling, "take about three grains, and cupel about thirty grains of pure test lead. If by the wet method, its approximate value must be guessed as near as possible, and an amount that would more or less equal pure silver be dissolved, and its standard sought by the solutions. Supposing, however, that their supposed standards are 999.93, 970; now search in the soft column for the numbers nearest to them. They will be found to be 1110, 1050, 1150 respectively. These weights are to be weighed up most accurately, and carefully dissolved in pure nitric acid, with all the precautions pointed out. Now take a pipette full of the normal solution, and run in the solution, and replace the stoppers, and shake violently; proceed with the decimal solutions: run in each of them a tenth of the salt decimal solution. Suppose a cloudy precipitate falls down the two first, but not from the last one. Agitate the two first ones well, and replace them in the saucenap. We know, by no precipitate falling down in the third one, that we have too much salt solution in already, so we run in a tenth of the silver solution to equalize the tenth of the salt solution already run. We are now where we started from, and we know that we have to start with the nitrate solution again. Accordingly, we run in a tenth of the silver solution; it gives a precipitate; another, and the same effect follows; and so on, five times. The sixth, however, does not. Consequently, as before stated, we deduct the sixth and half the fifth, making four and a half run in to be counted. To find out, therefore, the real standard, which was supposed at first to be equivalent to 1150, we seek in the nitrate of silver column for the number 1150, and look out in the fourth column (omitting the half for the time), as we have run in four pipettes of the nitrate solution, we find the number 860.1, which, diminished by 5, gives 855.6 as the true standard.

Now proceed with the other two. We run into four pipettes of the salt solution: all give a precipitate; the fifth does not. Consequently, we count only three and a half. Now look in the salt tables for the numbers 1110 and 1050, which represent the two first, and give the required standard of the alloy. We find them 904.6 and 855.2. By adding 5 to these numbers, we get 904.1 and 855.7 as the required standards. It saves a great deal of work if we endeavor always to avoid having to use the decimal solution of silver. We may avoid this by taking particular care to weigh up a sufficient quantity of alloy to equalize pure silver, or other ways to make tolerably sure of having sufficient alloy in our solution for us to commence with the salt solution at once. So much depends on manipulation, that unless a considerable deal of experience has been gained, much handling and equalizing the solutions ought to be avoided.

The salt solution should be kept free from dust or dirt, and occasionally tested. By means of the above apparatus, which altogether costs only a few shillings, perfectly accurate results are obtained; indeed, much more so than by more expensive apparatus.

Official List of Patents

PREPARED EXPRESSLY FOR THE JEWELLER'S CIRCULAR.

Issued by the U. S. Patent Office for the month ending August 4th, that relate to the arts and manufactures represented by the JEWELLER'S CIRCULAR.

16124.—Tools for pivoting watches—whereas—Frank R. Perkins, Esq. Tilton, N. H.

BRIEF—A plunger or piston is provided in its outer end with a seat to receive the pivot and fast to which it is required, the wheel being held in place by a retaining cap, through which the plunger is inserted, in line with the socket in the plunger, to contain and hold in place, the plug to be inserted.

16489.—Watch Keys—John C. Durbin, Cincinnati, Ohio.

BRIEF—The combination of a pendant with an extender, and a removable key.

16498.—Watch Case Springs and Catches—Isaac N. Hopkins, Lockport, N. Y.

BRIEF—New spring may be inserted without removing the case, for cover, the spring being attached to the push pin.

16573.—Safety Pinholes for Watches—Lymann W. Thompson, Chicago, N. Y.

BRIEF—A Safety Whisk in which the recoil, when the main-spring breaks, acts upon a flat, and spring causing the watch to turn and rise from the inclined notch in the third wheel, thus releasing said wheel from connection with the train.

16517.—Charms for Watch Chains—R. B. Elder, Philadelphia, Pa.

BRIEF—A Charm or Watch Chain consisting of a ball, a twisted canno, and a clasp, the latter formed with a hook at its end above the ball.

16522.—Soldering Apparatus—Geo. H. Perkins, Philadelphia, Pa.

BRIEF—A pivoted bar provided with an arm that serves as a counter-balance. Spring fingers are arranged up the bar, and press upon the piece to be soldered.

16526.—Electric Winding Mechanism for Clocks—John Wm. Wignall, Manchester, England.

BRIEF—Removal of motor allows battery plates to move into liquid, sending current around magnets, operation when charged, to wind up the motor and withdraw plates.

16542.—Calendar Clocks—W. A. Terry, Bristol, U. S.

BRIEF—A perpetual calendar in which the varying changes of the months and years are regulated by the run of a compound lever with certain stop devices.

16547.—Smelting Furnaces—Henry C. Creal, Chicago City, Wyoming.

BRIEF—The central fire and the lower end fires make a draft up the main flue, and aid in heating the furnace, and the upper fire-furnaces act like the fires of reverberating furnaces.

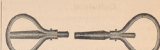
16555.—Calendar Clocks—A. A. Cowles, New York, N. Y.

BRIEF—The cylinder, carrying the calendar for the month, is moved through the medium of a lever actuated by certain devices connected with the striking mechanism.

16563.—Watch Key Combination Tools—Oliver D. Warfield, Chicago, Mass.

BRIEF—Key-like bar in case or cover for a watch key, enabling it to form a sort of lever.

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The ONLY LOW PRICED DRESS PROOF KEY MANUFACTURERS.

Light Hardware and Patented Articles made to order.

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Celluloid.

In reply to various correspondents asking for a description of this substance, which is now coming into extensive use, we would state that celluloid is the name given to a kind of solidified collodion. The latter is composed of some fibrous nitric acid. The cotton then possesses the quality of solubility and sudden explosion, and is termed "gun cotton," or pyroxylin. This pyroxylin can be dissolved in ether and alcohol, and when so treated is called collodion, and is used in photography for covering the glass plates on which the negatives are made. The dissolved pyroxylin is poured on the glass plate. The alcohol and ether rapidly evaporate, leaving on the glass a fine transparent membrane or skin, of considerable toughness—something like fine horn.

Celluloid is made by using camphor in place of alcohol and ether, in connection with the pyroxylin. The following is the description given by the inventors of celluloid, Messrs. John W. Hyatt, Jr., and Isaiah Smith Hyatt, of Newark, N. J.

"In the practice of our invention, we prepare pyroxylin by grinding it in water to a fine pulp in a machine such as is used in grinding paper pulp. We strain off the water as far as practicable, and then subject this pulp to a powerful pressure—for example, in a perforated vessel—to further expel the aqueous moisture, and to bring it to a comparatively solid and dry state, yet still retaining sufficient moisture to prevent it from burning in the further stages of the process.

We comminute gum camphor by grinding it in water, or, preferably, by pounding or rolling it, and thoroughly incorporate with the pyroxylin pulp in the condition last above described, this finely comminuted camphor, in about the proportion of one part, by weight, of camphor to two parts, by weight, of the pyroxylin in the pulp. These proportions may, however, be somewhat varied with good results. The moisture in the pulp serves to counteract any tendency of the camphor to prematurely develop its converting power under any stimulus incident to its being incorporated with the pulp, or to the further stages of the process.

With the camphor, we also thoroughly incorporate, with the pulp, any pigments, coloring matter, or other minerals that may be adapted to the requirements of the articles into which the product is to be manufactured. The camphor, or camphor and other ingredients, having been thus thoroughly mixed with the pulp, we next subject the mass to a powerful pressure, in order to expel the remaining aqueous moisture, and thereby not only dry the mixture, but force the camphor into more intimate contact with the pyroxylin throughout the mass, so that every atom of the camphor shall be in condition and place to exert its utmost converting power as developed.

The dried and compressed mass is next placed in a suitable mold or vessel—open at the top, and into this open top is fitted a plate or plunger. The vessel is then placed in a hydraulic or other powerful press, and a heavy pressure, applied to the plate or plunger, is brought to bear upon the mixture, which, while thus under pressure, is heated up, by steam or other convenient means, to a temperature of from 150° to 300° Fah., varying according to the quantity of the mixture; and the mass is kept in this temperature and under this pressure until the converting power of the camphor shall have been exerted upon the pyroxylin throughout the mass. The next developing the latent converting power, and the camphor exerting this converting power actively upon every atom of the pyroxylin, with which the mass is kept in intimate contact. The process of transformation is rapidly effected, and is completed almost as soon as the mass attains its maximum temperature, the resulting product being a homogeneous product, solidified collodion, or collodion compound having the qualities or properties hereinbefore specified.

This product, as it comes from the press, is of a consistency resembling that of soft leather, but upon exposure to the atmosphere it hardens, by reason of the slight evaporation of the camphor. The ultimate

product includes, however, a large proportion of the camphor as a permanent accretion to the mass, which accretion is not only a great gain over the use of ether, alcohol, or other solutions of volatile solvents, which would be entirely expelled or lost, but by its presence gives the solidified collodion or compound the great capability of being again rendered plastic by heat, and resolidified into any desired form or shape, without requiring the use of solutions or volatile solvents, or the addition of fusible gums, as heretofore.

A recent improvement on the foregoing consists in transforming pyroxylin in solidified collodion or celluloid, by using a liquid instead of a solid solvent, such as liquid solvent, like the solid, is latent at ordinary temperatures, but becomes active and dissolves the pyroxylin upon the application of heat.

The following is the process:—We make a weak solution of camphor in alcohol, the proportions being, by weight, one part of camphor to eight parts of alcohol. This solution of camphor is not a solvent of pyroxylin at ordinary temperatures, and we therefore term it a latent liquid solvent, but it becomes an active solvent at an elevated temperature.

In using this latent liquid solvent we first reduce the pyroxylin to a pulp, and mix therewith such coloring or other matters, if any, as are suitable to the required character of the product. The aqueous moisture is then expelled from the pulp. We then add to the dried pyroxylin or pyroxylin compound the above-described latent liquid solvent in about the proportions, by weight, of fifty parts of the solvent to one hundred parts of the pyroxylin. The solvent is stirred into the pulp, and the whole kept in a closed vessel until the solvent becomes equally diffused throughout the mass, no solvent action taking place to retard or prevent this even diffusion, as would be the case in the use of solvents that are active at ordinary temperatures. The compound is then subjected to heat and pressure in a similar manner to that employed when using the solid solvents.

Among the various uses for which celluloid is now employed is the production of dental plates for artificial teeth, and jewelry, the latter commodity, the Thayer Manufacturing Jewelry Co., of 229 Broadway, have brought to a high state of perfection. It is regarded as superior to rubber in many respects. A beautiful species of artificial ivory is also produced from celluloid as follows:—

We take, say, one hundred parts by weight of ivory dust, one hundred parts of pyroxylin, and fifty parts of powdered gum camphor. The pyroxylin is ground into a pulp while moist, and is afterward deprived of nearly all of its moisture, leaving it slightly damp, as a protection against its taking fire from any cause. It is thoroughly mixed with the ivory dust and gum camphor in the proportions just named. After being mixed, the mass is deprived of all remaining aqueous moisture, preferably by pressure between absorbing pads. To this compound, deprived of moisture, we then add fifty parts of nitric ether, and keep the whole within a closed vessel for several hours, or until the nitric ether has become equally and thoroughly diffused throughout the mass.

The nitric ether permeates and semi-dissolves the ivory dust, the camphor, and the pyroxylin, and thus properly disposes them for final treatment, which consists in bringing the whole compound together into a solid within a heated cylinder or molds under a heavy pressure, or by passing it through heated rollers. From 150° to 250° Fahrenheit of heat is required.—The result is a compound which, after being dried or seasoned, resembles natural ivory in color, texture, and homogeneousness. It is free from grain, is not affected by moisture, and is with great facility remolded into any desired form by heat and pressure in suitable molds.

The proportions of ingredients above set forth may be considerably varied to suit the consistency required and the use to which the compound is to be adapted. To the mixture may be added such pigments as are appropriate to the production of various colors.

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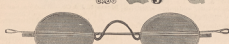
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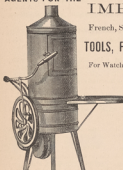
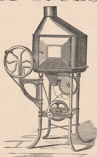
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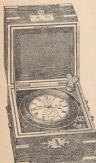
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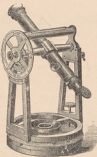
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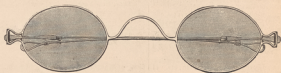
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Practical Hints on Watch Repairing.

By ECKHORN.—No. 6.

(80) We have now reached that portion of our subject which relates to the final adjustments of the hair-spring for the purpose of insuring that the vibrations of the balance, whether they be great or small, shall always be accomplished in equal time, when the spring is laid to rest. This adjustment is called isochronism. In my previous articles I have given general directions for fitting springs, which if followed, will prevent any very great errors of time from varying areas of vibration, and which, moreover, must be attended to before the last finishing touches, presently to be described, can be proceeded with. The isochronal adjustment of the hair-spring is, without doubt, the most delicate and least understood operation the watchmaker is called upon to perform. Many who talk and write most glibly about it do not appear to know even the meaning of the term. And upon considering their ideas we are forced to the conclusion that unless their practice is better than their theories it is not worth much; or else, if they do really understand the subject, they are purposely trying to lead others upon a wrong track, in order to show their knowledge to themselves. But to this there are, of course, honorable exceptions.

(81) I do not propose to advance any new theories, but to regard it in a very practical light, as a merely mechanical problem, requiring no profound knowledge, either scientific or mathematical, but which may be satisfactorily solved by any watchmaker of ordinary skill and patience. And I shall endeavor to give all necessary instructions for doing so. Even if the workman does not intend to undertake the isochronal adjustment, it is important that he should know how to discover whether the watch is too fast or slow, and at what extra price for, as isochronism, is or is not, for there is as much swindling of ignorant dealers on "isochronal hair-springs" as on "compensation balances," and for heat and cold, which not one out of a hundred so called are adjusted at all.

(82) If the hair-spring is not isochronal, the watch will vary from correct time, however the extent of the motion of the balance, or the "rate of vibration," as it is termed, is changed. In a watch having a going-barrel the vibrations are largest or longest when first wound up, and become smaller as the motive power becomes weaker, so that during every hour of the 24 the watch may keep a perceptibly different time. Some springs perform the short vibrations in less time than they do the long ones, while others do the reverse. A well made and well fitted spring will not vary much from uniform time, while a spring that is misshapen, crooked, out of center, unevenly coiled or tempered; that has been scraped, ground, much bent, or is very soft, will vary sometimes several minutes during the day, although it may be somewhere near right at the end of the day. Every change of the area of vibration caused by jarring, carrying, or the like, in different positions or of different temperatures, irregular winding, poor oil, dirt, etc., causes it to vary, so that for accurate timekeeping it is valuable.

(83) In duplex and cylinder escapements the resistance to the momentum of the balance caused by the pressure of the escape wheel during the free arc of motion of the balance, is greater or less in proportion to the greater or less motive force, and therefore these escapements are, in some degree self-compensating for irregular motive force. Yet they do vibrate further when first wound up. In English levers and chronometers the fuzee and chain are employed to equalize the motive power. But, to do this accurately, the fuzee must be cut in conformity to the varying strength of the particular mainspring used, which is seldom done, as is shown by the varying rates. But were it so, the friction upon the balance pivots in different positions is another disturbing influence in all watches. And even if the watch is adjusted for position, the thickening of the oil, accumulation of dirt, etc., by running, causes the vibrations to gradually diminish.

(84) As it is practically impossible to prevent the arc of vibration from varying more or less, it is necessary in fine watches, after reducing that variation to the smallest possible amount, to adjust the hair-spring within those limits so that no error of time shall result from such unavoidable changes of the area of the balance. This adjustment, called isochronism, of the hair-spring can be done in different ways, which we shall consider at some length. But before undertaking this, and even before we can safely test our spring to see what and how much adjustment it requires, there are certain other points to be attended to.

(85) Besides observing the instructions already given for the correct forming and fitting of the spring itself, the balance and the lever must be perfectly poised; the balance, spring, lever, and all other parts in the watch, even the springs in the case, must be free from magnetism; the movement must be in good condition to transmit the motive force uniformly to the balance; the escapement, particularly, must be as perfect as it can be made; the end-shake of the balance, lever and escape-wheel no greater than is necessary to give freedom of motion, so that there can be no material change in their relative positions; the pivots of the lever and balance staffs well fitted to their jewel holes; the lever pivots well polished and free from any "binding" in any position of the movement; the balance pivots straight, hard and round, well polished, as small as is consistent with strength, their shoulders well clear of the jewel and the balance not running too near the plate, bridge or any other part; the hole jewels thin and the holes round and perfectly polished; the holes not perfectly cylindrical, but a little rounded out enlarged towards each end, to diminish the extent of surface in contact with the pivots, and prevent any possible binding by either the jewel or pivot not being set exactly true, as well as to lessen the adhesion of the oil to the pivot; and in lever watches the ruby pin must be perfectly firm in its place and vertical, or parallel to the balance axis, and the slot in the end of the lever polished and well fitted to the ruby pin.

(86) If all this is not the case, it should be done so as nearly as possible, after which there is a certain order to be observed in our further proceedings. It is an established rule among workmen that the adjustment of the hair-spring for isochronism should be made before the balance is out, because after that is done the sections of the rim will fly outward by centrifugal force while vibrating, and disturb the perfection of the result. What reminds one of the old lady who gave her darling daughter permission to go in to swim, but cautioned her not to go near the water. That is precisely the reason why the balance should be cut, so that our adjustment may cover that irregularity. If the balance while vibrating would fly out alike, or the same amount in long vibrations as in short ones, then it might be possible, although difficult, to make a certain allowance for its effect, when isochronizing the spring, so that it should perform as correctly after cutting the balance as before. But it is not so.

(87) Most workmen have an idea that isochronism is some mysterious property of the spring which will enable it to overcome irregularities and difficulties and make the balance "come to time" in spite of changes. Now this is just as incorrect as to say that it is one of the properties of a pivot to fit its jewel hole. It will fit the hole after it is made to fit, and not until then. So, a hair-spring's isochronism is not after we have isochronized it, and not before. That is to say, after we have adjusted the shape of the spring so that, under the effect of all the disturbing influences acting upon it while the watch is going, it will make unequal vibrations in equal times, it is isochronized, or isochronal. Just as we say, after we have made the pivot, "it fits." But the fit is not a "property" of the pivot, nor is isochronism a property of the hair-spring. It is simply a term representing a certain condition of being adjusted to act in a certain way under certain circumstances. But if those circumstances are changed one atom, there is no property or power in the spring to

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vary its action to suit that change, or correct its effect. Whatever peculiarity of action it may have as the result of our manipulations, that action is unvarying. If we want it to overcome certain difficulties, we must alter it till it does overcome them. Hence the spring should be isochronized with the balance cut, and with all other influences, good or bad, which it is intended to neutralize, acting precisely as they will when the watch is finished and passed over to the customer.

(88) The adjustment to positions is another point which must now receive attention. We know that in nearly all watches the balance has a larger motion, or longer vibration, in a horizontal position than when it is in a vertical position, or with its edge up. This is caused by a greater friction on the balance pivots in the latter case. The adjustment to positions is effected by equalizing the frictions, so that the hair-spring will be able to move the balance through the same arc in any position in which it may be held. Generally, watches are adjusted for the two horizontal positions, and two vertical positions, the figure XII upwards, and III upwards. But a fine watch should be adjusted for all four positions, XII, VI, III and IX upwards. In all cases the equalizing of the frictions is to be done by lessening the greater ones—never increasing frictions unless that is unavoidable.

(89) The two horizontal frictions are equalized by making the ends of the balance pivots equally flat and well polished, and by the extent of the balance being readily observed when the dial is upwards, by setting the movement holder upon a piece of looking-glass on the bench. The balance can then be examined, and the movement above can be lined with the eye-glass while in that position, by looking from one side at such an angle that its image will be reflected into the glass. This is much better than holding the movement above one's head in order to see its under side, insures a true and equal horizontal position each time, and alleviates the trembling of the hand while holding it, which interferes with the motion of the balance—and is, besides, easier and safer.

(90) If the vertical vibrations are smaller than the horizontal ones, the other conditions being as described in sections (85, 86) the only way is to flatten the ends of the pivots till the balance will keep up about the same motion in all positions. Some workmen not only flatten the ends but go further and use round grinders or laps to hollow out the pivot end a little, and cause the entire weight to be sustained upon the ring of metal left around the outer edge of the pivot end. This brings the rubbing surface nearly as far from the centre of the pivot as the horizontal arc in the vertical position, but the practice is objectionable for several reasons, besides being difficult of execution. It is sufficient for all practical purposes to make the end of the pivots perfectly flat, or as nearly so as may be found necessary on trial.

(91) On the other hand, if the vibrations are greater than the theoretical ones in the horizontal position, then we slightly round off the end of the pivots to increase the arc in the horizontal position to an equal extent. These changes of the shape of the pivots should be done in a lathe, and very slowly and cautiously, lest we do too much. The best tool is a pivot burnisher, as that both polishes and hardens the surface. If a stone lap is used, the burnisher should finish the job. In rounding off the end, the departure from a perfect flatness on the end of the pivot should be only sufficient to prevent actual contact with the end-stone, so that the rounding off shall be hardly perceptible to the eye. First remove a narrow ring around the outer edge of the pivot. If it is enough, take off a little nearer to the centre of the pivot. If too much is taken off we shall have to flatten the end again, which will shorten the pivots. Therefore we take off but little at a time, and as equally as possible off each pivot. Always remove any "feather-edge" that may appear at the corners of the pivots, with an oil-stone slip.

(92) Having substantially equalized the vibrations, any remaining error can be easily compensated for by the isochron-

ing of the spring, which should follow, not precede, the adjustment to positions. Most workmen test that adjustment by timing the watch in different positions, and make the alterations of the pivots according to the results. But in the time, instead of by the differences in the vibrations as above directed. But it is clear that if the spring were isochronal there would be no change of time in the different positions, even if the frictions and arcs of vibration were different. Hence that test is of no use except before the spring is isochronized, and even then it is a mere waste of time and labor, because the same information can be gained instantly by simply observing the extent of the arcs of vibration in different positions. For, if the arcs are the same, the times will be the same. And when we have equalized the arcs, we may be certain that they will perform in equal times, without taking the trouble to try them.

(93) Other methods of adjusting to positions are often followed by "the best workmen." Some throw the balance out of poise in such way as to equalize the vibrations in different positions. For instance, if the watch goes faster in the hanging position, or XII up, than when horizontal, they make it go slower by increasing the friction of vibration, &c. Allowing the balance to come to rest, they make that side which is at the top when the figure XII is up heavier, by drawing out one or two screws in the rim or otherwise. Or, if it loses in that position, they make the bottom heavier, so that the motion will be lessened. Now in a justed compass balance this would probably destroy the adjustment for heat and cold. Even with an unadjusted balance this plan may be unsuccessful, for a greater vibration may be either quicker or slower, according to the spring—and the change of vibration may produce the opposite effect to that designed. Or, if the spring be isochronal, it will have no effect upon the time except the injurious one caused by the want of poise.

(94) Others bend the hair-spring to one side, instead of leaving it free and concentric with the balance axis, as it should be. For instance, if the watch loses with XII up, but goes correctly with III up, the spring is bent towards the figure XII, so that when that side is upwards the spring will naturally support the balance and lessen the friction in that position. Workmen who follow this method adjust only for the two horizontal positions and two vertical positions, viz. XII up and III up. And they calculate that, by thus adding a side pressure of the pivot to the friction upon its end, they will increase the friction while in the horizontal positions, and so make it equal in the horizontal and vertical positions. Now it is sufficient to say that either of the two preceding methods is directly wrong in principle, being directly destructive to the isochronism of the spring, and injures the watch in all positions for the sake of a little apparent improvement in one or two. No good workman will use either of them, nor will he need to do so if he properly understands his business.

(95) The arc of vibration should be the same in each of the four vertical positions. If it is not, there may be different causes. The balance may be out of poise; the balance jewel holes may not be round, not evenly polished in-side, or too large for the pivots; the balance may be too loose the lever, escape wheel, etc., or away from them, and interfere or change the action of the parts. The change of the arcs when held in the different positions will guide us to the cause. Inasmuch as the greater the friction is, the smaller the arc will be, we know in which position to remedy the inequality of the friction, and we may also ascertain the effect of our alterations by simply noting the change in the arcs. It is desirable to equalize the frictions in the different positions as nearly as possible, as it leaves less to be accomplished by isochronizing the spring, and there is a limit to the amount of irregularity which this adjustment can compensate for. The more perfect all the parts of the watch are, the finer the performance which we may hope to obtain from the spring.

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(96) But "the best workmen" and writers very profoundly inform us that, in practice, it is better that the isochronism should not be quite perfect, because after running awhile the oil will thicken and dirt will clog the works and weaken the effective motive force, while the motion of the balance will be impeded by the same causes acting upon its pivots, so that the vibrations will constantly become smaller; and that, therefore, the short vibrations should gain upon the long ones, because otherwise the increased friction in the diminished vibrations would cause them to lose time, but by quickening them a little they will perform correctly. Just so! How remarkable?

(97) With all due respect to eminent authorities, lifelong experience and profound wisdom, I beg to say that such a practice or such an opinion is a sorry comment upon the skill of its author. It is commonly supposed that Marine Chronometers, at least, have isochronized hairsprings. But if their makers really possessed the ability to isochronize springs, why should they recommend to make the short vibrations gain on the long ones, as they do, (different makers varying all the way from 4 to 15 seconds in 24 hours,) when the arcs are reduced from a turn and a quarter to three-quarters of a turn? It is to meet precisely such conditions that springs are isochronized. Either they do not believe that springs really can be so adjusted as to perform great and small arcs in equal times, or they have not the skill to do it, and adopt this clever method of concealing their incompetence.

(98) Their idea appears to be that, because of the friction, the watch will lose time. Now we know that the smaller vibrations may be performed either quicker or slower than the long ones, according to the nature of the spring attached to the balance. Therefore if their men honestly believe what they say, and if their idea amounts to anything at all, it is that the friction affects the time of the vibration independently of its extent. Or, to put it in its most naked form, they believe that a vibration made small by friction will be slower than a vibration of the same extent free from that friction—and that the small vibrations of a dirty chronometer will lose, therefore we must provide for this beforehand by making them gain while the chronometer is clean! It seems scarcely credible that any workman of average intelligence should harbor such a belief, for it is almost self-evident that the only effect of increased friction is to lessen the extent of the vibration, and that the time required to accomplish a vibration is dependent upon its extent, and not at all upon the friction—except indirectly, through its effect upon the extent of the arc.

(99) But, to satisfy those who are susceptible to only one method of proof, that of actual trial, let them try it in a lever watch with a going-barrel, first timing it with a small motion free from friction, the main-spring only wound up half a turn, and re-wound at intervals, for 12 hours, then try it another 12 hours with the spring wound entirely up to its greatest strength, and kept so by frequent winding as before—but reduce the motion of the balance to the same as it had previously, by some sort of friction. This may be done by fixing a bristle or hair to rest against the balance staff, or by lubricating the lower pivot with castor oil, molasses or other thick liquid, or even by unsewing the end-stone and allowing the pivot shoulder to rub on the jewel. Be careful that this friction shall be equal throughout the test, and not so great as to prevent the watch from keeping time. The use of the bristle is best, because more under control. This is a crude experiment, but it is adapted to convince people with such crude ideas as that the time in which a certain arc of vibration will be performed depends on the amount of friction which has been overcome. Leaving them to ponder over the above at their leisure, we will proceed, with the aid of the following practical hints, to have nothing to do with the frictions upon the balance pivots, in adjusting the spring for isochronism, but seek look no further back than the extent of the vibrations.

Assaying Gold and Silver.

The filling of the large pipette with the normal solution may be more effectually and easily performed by means of a siphon stand with two ordinary movable wooden filter rings, thus: screw on the lower one tight, and rest the shoulder of the pipette in just sufficiently high from the table to clear the neck of the solution bottle. Now put on the other ring, and slip it over the tube of the pipette, and screw it tight down on the upper shoulder of the pipette. Your pipette is now held quite fast. Place the point of the jet connected with the india-rubber tube from the solution bottle in the neck of the pipette, and fill as usual. This leaves your hands free to manipulate the flasks, &c.

ESTIMATION OF SILVER BY THE CHLORIDE PROCESS.

There is another method of estimating silver bullion when alloyed with other metals, viz., by calculating the fine metal by means of its chloride.

In November, 1871, an account of it was given by Dr. Busted, from which the following is condensed:

The sample is accurately weighed as usual, and placed in their respective bottles, and 1½ drachms of nitric acid is added to them from a graduated pipette, and transferred to a small dish, where the contents of the bottles are completely dissolved. The S.G. of the acid in case of alloys is generally 1200; but when the presence of foreign substances metals is suspected, acid of 1420 S.G. is used. Six ounces of cold distilled water are now added, and subsequently 1½ drachms of hydrochloric acid, S.G. 1000. Of course, chloride of silver immediately forms in white curdy clouds of precipitate. The stoppers are then placed in their respective bottles, well washed previously in distilled water, and the bottles and contents are allowed to stand for five minutes. They are then well shaken for three or four minutes, till all the chloride precipitates. Some more distilled water is added till the contents of the bottles are two inches of the neck, and the contents allowed to stand for four hours. After this, the superfluous liquid is drawn off by a siphon, and care not to draw up any chloride. More distilled water is added, and, after two hours' rest, is drawn off as before, and sometimes a third and fourth washing is given. The bottles are then placed on their sides for half an hour, to enable the chloride to settle in one place. Meanwhile a pneumatic trough is prepared and filled with distilled water: corresponding to each bottle there is placed on the floor of the trough a small porcelain saucer with a porcelain cup each numbered correspondingly to the bottles.

The stoppers are then removed from the bottles, and the operator places the forefinger of his hand over the mouth of the bottle, and inverts it over the appropriate cup, and almost down to the bottom. The contained chloride is allowed to fall into the cup by its own weight. If this is slightly manipulated, none of the chloride falls into the saucer. The cups are carefully lifted out and decanted almost dry: they are then gradually dried in a steam bath till the chloride forms a loose cake at the bottom of the cup. They are dried at a temperature of about 300 Fahr. for, more or less, two hours, when it is weighed. If the operation has been skillfully conducted, the chloride exists as a firm, unbroken cake at the bottom of the cup, and can be easily lifted out by a pair of forceps.

The only objection to this process is that if any gold exists in the sample assayed, it is not dissolved, and consequently gets thrown down with the chloride and is lost. This is remedied by the use of which, accident does not occur by the volumetric method. 18.225 grains of pure silver equal 25 grains of chloride. This weight, therefore, has become the standard weight for an assay. Instead, however, of having to be continually referring to tables, or calculating the proportion of silver to pure metal, the assayer is enabled by stamping the weights, not with its actual weight, but with the actual value which such an amount of chloride would represent in pure silver. Thus, supposing the resulting chloride weighed 22.8 grains,



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which would represent 10.94 grains of pure silver, and consequently 900.00 fine, the weight would not have 22.5 marked on it, but 900, so that the assayer simply reads off the value at once.

The whole process takes, more or less, twenty-four hours. Although this process seems peculiarly adapted to the Indian mint, still it is evident that it is a much more tedious process than the volumetric method. Indeed, in the Indian mint it appears that the assays are not reported till the third day. It moreover appears that the gold, as before stated, is estimated as silver, which does not occur in the volumetric analysis. It is also evident that much more apparatus and manipulation is required than in the first process. On the whole, it is difficult to see the advantage of the above method.

BLOWPIPE ASSAY OF SILVER.

This is probably the most useful assay that falls under the practical assayer's notice. Every student who wishes to get a clearer insight into the routine of blowpipe analysis is recommended to obtain Dr. Thompson's "Guide to Mineral Examination," Plattner's work on the Blowpipe, and also the Numbers 280-84, 892-98, 412 of the *Chemical News*, containing the observations of David H. Bates, F. R. S.

A small portion of the substance to be assayed, varying in size according to the richness of the sample, is to be carefully weighed on the blowpipe balance. This is to be mixed with some granulated lead and soda, and placed in a cavity of a sound piece of charcoal. The blowpipe flame is to be cautiously applied to the substance: after a bit the lead may be increased, and the substance finally fused into a globule of silver-lead, in precisely the same manner as in the crucible assay. It is advisable to take large portions as possible of the substance, in order to get more satisfactory results, and invariably to take two or three assays.

The silver-lead thus obtained is then placed on a rather coarse cupel, bound round with a piece of iron wire to hold it, and the cupel heated in the blowpipe flame, or on the hob of a fire, to completely dry it. When thoroughly dry, direct the point of a good flame on to the lead, which is forthwith fused, and immediately commences to oxidize and rotate, the same as in a muffle. This oxidizing process must be kept up at the lowest temperature that will keep the lead fused, for reasons already explained. The globule must be kept in contact with the melted litharge. If the lead is rich in silver, very little rainbow colors play on the surface. If copper is present in the assay, the cupel is black; but if the ore is free from foreign metals, the characteristic lemon-yellow of lead appears. When the globule is reduced to about one-third of its size, or the dimension of No. 2 shot, it should be removed from the flame, taking care, as in the muffle assay, not to withdraw the assay too soon, but to cool it off gradually.

The cooled piece of solid charcoal has a hole neatly scooped in the side, and a small quantity of very fine bone-ash, thoroughly dried, is pressed firmly into it with the finger. The assay must be completely rounded off and smoothed down, and dried as usual in the blowpipe flame. The globule of silver-lead is then placed on it, and the point of the flame directed on to it for a moment to fuse it; when well fused, draw the cupel away, and keep the point of the flame playing just on the edge of the bead, so that it is hot but not touching the bead, at an angle of 45 degrees. The flame must be hotter than in the preceding operation—hot enough to keep the litharge evenly melted, and to prevent forming under the lead, which would cause the oxidation to stop. If the lead is retarded, as sometimes happens, by intimate portions of the cupel or litharge sticking to it, the cupel must be inclined to one side, and the bead allowed to roll down to another place: a small fraction of lead facilitates this. When the bright-red color takes place, direct the point of the blue flame on the bead for about ten seconds with a good strong blast, to detach any film of lead which might otherwise adhere to it, and gradually to prevent vent spitting. By this means assays of silver may be made of the most surprising accuracy.

Selections from Saunder's *Traité d'Horlogerie*.

Translated for the *Jeweler's Chronicle and Horological Review* by Joseph T. Rogers.

THE WEIGHT OF THE BALANCE MUST BE IN PROPORTION TO THE MOTIVE FORCE—ITS DISTRIBUTION AMONG THE DIFFERENT PARTS.

The weight of a balance of a given diameter must be increased just as much as the net impelling force acting on the balance, and vice versa.

We can illustrate this with an example. Let us suppose a cylinder escapement, the inclined plane of which is curved, and very low; if we double the motive force, the pressure of the scape wheel teeth on the cylinder, will be considerably increased, without having doubled the impelling force on the balance, therefore if the weight on the balance be doubled it will not have an angular motion in proportion to the increase in the motive force.

In a watch, considered alone, the wheel and escapement being the same, we can take as the starting point the force of the main-spring, to attain the relation between the weight of the balance and the motive power, but it will be otherwise if we compare different watches, because the amount of force absorbed by the escapement is different in every watch. For this reason we cannot accept as correct the table of the sizes and weights of the balance deduced by M. C. Frodsham from the cubic capacities of the barrels. It can only afford an approximation.

The work at the Geneva manufactures is generally more carefully designed than elsewhere; therefore the balances they use are a little heavier.

The best distribution of the total weight of a balance into its different parts can only be determined by experiments, because its rigidity changes according to the metal we use. To become thoroughly acquainted with this matter, we have taken the sizes of a large number of balances and especially those marked as having produced the best regulating power. We had them broken afterwards and we have weighed the rim, arms, and central disc. The result of the above operation is this: The limit we must stop at for the distribution of the total weight among the different parts of the balance is:

For the rim, $\frac{1}{3}$ of the weight.
For the arms and centre, $\frac{1}{3}$ of the same.
The division of the total weight, as has already been observed is deduced from the examination of a certain number of well regulated watches; it is the lowest limit determined by the resistance of the matter the arms are composed of, which is generally brass. In the compensated balances, these arms being made of steel, they can proportionally support a heavier weight. Thus in a chronometer balance weighing totally about 42 deagrammes, it is sufficient for the small bar and the centre to weigh about 7 deagrammes. The rim and its screws or weights will then concentrate $\frac{1}{3}$, $\frac{1}{3}$ of the weight. Let the proportion be:

In the rim,	21
Arms and centre,	21
Total, 24	

The weight of these arms might be increased, but we have to be warned against a tendency on their part to yield under the weight of the rim, weights, etc., which would introduce an element of irregularity very hard to detect or ascertain.

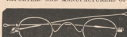
A TABLE TO DETERMINE THE WEIGHTS AND SIZES OF THE USUAL BALANCES.

After having studied several watches of the best workmanship in the market, the weight and diameter of the balance of which have always produced reliable results, we have been able to construct the following Table of Weights, determining

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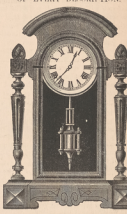
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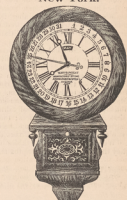
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or all kinds of Coral Jewelry, and we can assure the trade that any Coral work entrusted to us will be executed in the most approved manner. Coral of any desired pattern supplied from our stock, or carved to order.

the medium sizes of common brass balances used in modern watches:

Diameter.	Weight.	Mod. difference between two diameters in succession.	Mod. difference between two weights in succession.
1 millim.	14 millim.	19 centigr.	3 centigr.
1 " "	15 " "	21 " "	3 " "
1 " "	16 " "	23 " "	3 " "
1 " "	17 " "	25 " "	3 " "
1 " "	18 " "	27 " "	3 " "
1 " "	19 " "	29 " "	3 " "
1 " "	20 " "	31 " "	3 " "
1 " "	21 " "	33 " "	3 " "
1 " "	22 " "	35 " "	3 " "

IMPORTANT OBSERVATIONS.

This table shows that the force will increase regularly with the weight and a great deal faster than the diameter; therefore everything being in proportion, if we take as the starting point the barrel's diameter, the force will be sufficient in the large size pieces, and so it will become necessary to place there a balance proportionally smaller. This is another proof that we can not take the barrel as the measure of the balance.

If we take for instance one of those watches which has been going all right for a long time, with a balance making 18000 vibrations per hour, exactly in accordance with the data furnished in our last table, then the watchmaker can estimate himself the force of the main-spring impelling any of the other balances.

The manufacturer has to bear well in mind that he will never attain perfection if he is not able to determine for himself the relation between the weight of the balance and the motive force intended to keep the balance in motion. He must not forget, however, as we have already explained in another chapter, that the motive force can not be represented by the exact strength of the main-spring, because in the transmission of the force through the wheels and escapement, more or less is lost by decomposition. All these points are very important in determining the weight of a balance which is to become the standard for a certain kind of time-piece.

As the compensation balance is principally used for high and strong watches, its weight is necessarily higher than that of ordinary table, but always in proportion to the inverse ratio of the motive force, consequently the table is also fit for them.

Mr. Marthen, a very skillful watchmaker has published in Germany several tables of the sizes and weights of balances; but we do not agree entirely with ours and seem to refer to the work done at La Chaux de Fonds. We offer some of those tables below; they will furnish a first approximation:

Sizes and Weights of Chronometer Balances. Taken from pieces having had a good record. Unity of measure, the millimeter, and the gramme.

STONES POCKET CHRONOMETERS.		REMARKS.	
RANGE.	TOTAL VARIATION per month	CHARACTERIZATION per month	
regiment	unknown	38	5
regiment	1.50	38.7	5
regiment	2	41	5
emb	2	10	5
regiment	2	18	5
emb	do	19	5
regiment	2	41	5
emb	do	2	4
regiment	2.50	38	5
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Hints to Watchmakers.

TO CLEAN A CLOCK.

Take a movement of the clock "to pieces." Brush the wheels and pivots thoroughly with a stiff coarse brush; also the plates which the trains work. Clean the pivots well by turning in a piece of cotton cloth held tight between your thumb and finger. The pivot holes in the plates are generally cleaned by turning a piece of wood into them, but I have always found a strip of cloth or a soft cord drawn slightly through them to act the best. If you use two cords, the first one slightly oiled, and the next dry, to clean the oil out, all the better. Do not use salt or acid to clean your clock—it can do no good, but may do a great deal of harm. Boiling the movement in water, as is the practice of some, is also foolishness.

TO BUSH.

The hole through which the great arbor, or winding axle, work, are the only ones that usually require bushing. When they have become too much worn, the great wheel on the axle before named must go deeply into the pinions above it and stops the clock. To remedy this bushing is necessary, of course. The most common way of doing it is to drive a steel pin into the plate just above the axle hole, thus forcing the brass downwards until the hole is reduced to its original size. Another mode is to solder a piece of brass upon the plate in such a position as to hold the axle down in the proper place. If you simply wash your clock to run, and have no ambition to produce a bush that will look workmanlike, about as good a way as any is to fit a piece of hard wood between the post which comes through the top of the plate and axle. Make it long enough to hold the axle to its proper place, so that the axle will run on the end of the grain. Cut notches where the pivots come through, and secure by wrapping around it and the plate a piece of sewing machine thread.

TO REMEDY WORN PIVOTS.

Turn the leaves or rollers, so the worn pivots upon them will be towards the arbor or shaft, and fasten them in that position. If they are "rolling pinions" and you cannot secure them otherwise, your clock will be better off with a little soft solder.

TO OIL PROPERLY.

Oil only, and very lightly, the pallets of the verge, the steel pin upon which the verge works, and the point where the loop of the verge wire works over the pendulum wire. Use none but the best watch oil. Though you might be working constantly at the clock-repairing business, a bottle costing you but twenty-five cents would last you two years at least. You can buy it at any watch-furnishing establishment.

TO MAKE THE CLOCK STRIKE CORRECTLY.

If not very cautious in putting up your clock you will get some of the striking train wheels in wrong, and thus produce a derangement in the striking. If this should happen, pry the plates apart on the striking side, slip the pivots of the upper wheels out, and having disconnected them from the train, turn the part around and put them back. If still not right, repeat the experiment. A few efforts at this will get them to working properly. The sound in cuckoo clocks is caused by a wire acting on a small bellows which is connected with two small pipes like organ pipes.

A DEFECT TO LOOK AFTER.

Always examine the pendulum wire at the point where the loop of the verge wire works over it. You will generally find a small notch, or at least a rough place worn there. Dress it out perfectly smooth, or your clock will not be likely to work well. Smaltz or oil of spike lavender, and grind up; paint with a small-camellair pencil.

FIGURES ON GOLD AND SILVER DIALS.

Hold a small piece of copper over a gas flame for a few minutes till it is coated with soot; clear this off on to a piece of finely ground glass, add fat oil and a small quantity of oil of spike lavender, and grind up; paint with a small-camellair pencil.

TO DETERMINE THE EXACT FOCAL DISTANCE.

OF SPECTACLE GLASSES.

Place the end of a measure of thirty or forty inches in length against a smooth wall, or other suitable ground, in plain view of some well-defined object a few rods distant, as, for instance a building or window on the opposite side of the street. Then place the edge of your lens on the measure, and move it backwards or forwards until a spectrum is formed, or, in other words, until a clear and distinct outline of the distant object is produced on the ground against which your measure rests. This point will represent sufficiently near, for all practical purposes, the exact focal distance of the lens, and will correspond in inches with the number on all properly marked convex spectacles. For mounting fine axed spectacle frames, use the best gold solder in preference to silver or brass solder.

VALUABLE RECIPES FOR GOLDSMITHS.

Standard gold is compounded of 440 grains of fine gold, and 40 grains (Troy weight), to the oz alloy; therefore, when you judge how much gold a piece of work will take, compound it to the standard weight by the following directions:—*Assay Weight*.—The weight of gold is a pound, which is divided into 12 ozs, each oz into 24 carats, each carat into 4 grains, and each grain into 4 quarters; then if you see the assay quarter-grain, is in reality 14 grain Troy.

ON MELTING AND REFINING.

In melting *Brass Gold*, urge the fire to a great heat, and stir the metal with the long stem of a tobacco pipe to prevent flame-combustion. If steel or iron filings get into gold while melting, throw in a piece of sandifer the size of a common nut; it will attract the iron or steel from the gold into the flux, or sublimate of mercury will destroy the iron or steel. To cause gold to roll well, melt with a good heat, add a teaspoonful of sal ammoniac and charcoal, equal quantities, both pulverized, stir up well, stop on the cover for 2 minutes, and pour.

TO REFINER SWEEPINGS CONTAINING GOLD OR SILVER.

To 8 ozs. of the dirt, which has been washed and burnt, add salt; 4 ozs.; pearl ash 4 ozs.; red tartar 1 oz.; salpêtre 4 ozs., mixed and roughly in a mortar, melt in a crucible, and dissolve out the precious metals in a button.

TO PURE GOLD DUST.

Use such a crucible as is generally used for melting brass; heat very hot; then add your gold dust mixed with powdered borax; after some time a scum or slag will arise on the top, which may be thickened by the addition of a little lime or bone ash. If the dust contains any of the more oxidizable metals, add a little nitre, skim off the slag or scum very carefully; when melted, pour the crucible into a strong iron tongs, and pour off immediately into cast iron moulds, slightly greased. The slag and crucibles may be afterwards pulverized, and the auriferous matter dissolved from the mass through cupellation by means of lead.

GOLD ALLOYS.

Rated standard for watch cases, etc., is 18k. of fine gold and 6 of alloy. No gold of inferior quality can receive the "Hall mark;" and gold of lower quality is generally described by its commercial value. The alloy may be entirely silver, which will give a green color, or entirely copper for a red color, but the copper and silver are more usually mixed in one alloy according to the taste of the jeweler. It will be understood that these are all made with fine gold, fine silver, and fine copper, refined from the refiner. Gold of 22 carats fine being sold less, is intentionally omitted. 1. Gold of 18 carats of yellow tint. Gold 15 dwt, silver, 1 dwt, 18 grs. 2. Gold of 18 carats, red tint. Gold 15 dwt, silver, 1 dwt, 18 grs. copper, 3 dwt, 6 grs. 3. Spring gold of 16 carats. Gold 11 oz, silver, 6 dwt, copper, 12 dwt. This when drawn or rolled into very hard makes springs little inferior to steel; 4. Jewelers' Fine Gold, yellow tint, 10k. Gold 10 dwt, silver, 7 dwt, copper, 3 dwt. 5. Gold of red tint, 18 carats. Gold 1 oz, silver, 2 dwt, copper, 8 dwt.

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BRAINERD, STEELE & CO.

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And FINE GOLD JEWELRY.

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NEW YORK.

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To the Retail Jewelry Trade.

No general is the present business depression, that it is not reasonable to suppose that the sale of the smaller and less expensive articles of jewelry, will for some time to come be much larger than usual. You can have nothing more staple or sure of sale, at a fair profit, than a well-assorted stock of moderate priced Gold Rings. For 20 years we have made a constantly increasing variety of *Brainerd's Solider Rings*, which we have always warranted, and which have never disappointed any purchaser. The market has lately been flooded with cheap plated hard solder and low karat Solid Rings, which many jobbers have preferred to sell you instead of ours, because they could make a larger profit on them. The result has been, in many cases, that the retailer has become disgusted with all hard solder rings, and so he keeps a respectable stock of our Rings.

We want you to know that we still make nearly 400 patterns of hard solder rings, of every variety of style for men, women and children, that they are struck from 10 karat solid with 10 karat lining, and put together with some of our own, and 18 karat solid, and that every ring is as well finished as the best Diamond work. They are all stamped and warranted to give entire satisfaction, and ask of you to make a trial of them, assuring you that they are the most hard solder ring yet made, and confidently appealing to some of the most careful dealers in the country for confirmation of our assertion.

We also offer a long line of solid 14 karat Cameo, Amethyst, Coral, Roman Enamelled and Engraved sets, together with many other goods in our line, as low as any other Manufacturers in the land. Respectfully, **BRVANT & BENTLEY**, Manufacturing Jewelers, 12 Maiden Lane, New York, January, 1875.

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PARIS, 37 Rue Paradis, Poissoniere. LONDON, 21 Hutton Garden. Factory at Göttingen, Moselle, France.

you—we mean no pun—if you are very green indeed, a fine Piatowsky or two out of the tray in the shop window; or if he really takes a liking to you he will let you have, for a consideration, a genuine antique now and again from the little trays lined with purple velvet of his private cabinet within. But it is worth any money to hear him discuss the subject from his own point of view.

"Ach!" he says, patting us upon the back encouragingly, as we select a fine Roman engraving of the Republic—an Othryades tracing with his own blood as he calls "Victory" upon his enemy's shield. "Ach! you have ze taste for ze true antique. But dis schwine of a modern people—no, indeed, he designated you, my enlightened British public of the sixteenth century!—day care for noting at all but five things in de wide world."

And here checking off these five things seriatim upon his fingers, with wonderful gesticulation and shrugging of shoulders, he went on, "De cow"—meaning, I suppose, agriculture—"de horse of Epsom"—he should—de drink" (tipping up with his hand an imaginary dram) and lastly, as he gets to the little finger, raising his arms whilst around him, and pointing to the neighborhood generally, he perlage the Haymarket in particular, "de woman!"

"But dese thirty, dese forty year," went on this glibly enthusiastic, "ever since I was born, I care for noting more than one ting;—and, pausing abruptly, he pointed with dramatic effect to the gems upon the table, and drew his little body up to its full height. "For dese little gems, meinber, I sacrifice everything in de world; if I see one beautiful stone, one stone dat is de true antique—what? I say him, 'If I have no money—what den? I buy him still. I take de watch out of my pocket, de bracelet off from my wife's arm, de very coat off from my back, and I buy dat lovely, beautiful stone; dat stone which has in him all of de most perfect art of de most perfect age of man!"

For dese things show you what de human mind and de human hand, wedded in de great cause of art, can do. De you love beauty? Here it is, in this little, little stone; a beauty dat will never decay nor change, nor treat you falsely wid a stab at de heart, as de live-in woman do. De do de you love skill and science? De engraving of dis gem shall show you a skill of hands as perfect as dat of de Venus or de Apollo in de marble of Pericleus, and shall call forth all de knowledge of de most learned to investigate and decipher its hidden meaning. De you love money?" (This in an earnest whisper, transmuting us with a piercing glance from glittering eyes of steel.) "Den dese beautiful gems shall pay you back de interest of time, of hope, of life, if you will, of gold, wid which you bought dem, far more dan you gave!"

So sang Herr Cohen Hertzog his dactylic-pane pan, standing erect in his dingy little back shop in a dirty lane near Leicester square. And as we listened entranced to the eloquent little German dilating upon his favorite subject, it seemed to us that never did the poetry of commerce find a more "sacred vates" than he.

Remarkable Work in Silver.

A London paper, *Iron*, gives the following interesting description of some specimens of the silversmiths' art lately sold in that city:

The series especially illustrated the application of the silversmith's art to the purposes of domestic use and the ornament of the *dressoir* in the sixteenth and seventeenth centuries, from the plain old English rat-tailed spoon, of which there were many most quaint and curious specimens, to the grand old baronial salts, the tall cups and noble beakers, the stoups, peg tankards, and the rare mazer bowls. Among them was a beautiful silver-gilt ewer, recently ornamented with Elizabethan *repoussé* work of fruit, foliage, and marine monsters, which is pronounced the finest piece of English goldsmith's work for form and design ever submitted to competition. This very noble piece stands about 16 inches high, and bears the hall-mark, quite distinct and perfect,

of the Lombard capital M, which gives the date of 1609—time of James I. The spoons formed an exceedingly curious and interesting feature in the collection. There were enough of the various patterns to furnish forth several tables in complete antique style—such as the quaint old flat-handled, broad-bowled rat-tails, so called from the tail-shaped ornament on the back of the bowl; or the seal-headed spoons, marked with the horse inscribed on the seal with the date, and one of which was unique, being all gilt and bearing the date mark S (Roman capital), which proves its pedigree from the year 1585 of Elizabeth. Then there were the superb Apostle spoons, some of foreign make, but the best of English work. Still rarer and more beautiful in the work were two spoons of foreign make, called trade spoons, each bearing a figure relating to the profession of the owner—one an apothecary fully equipped; the other, a carpenter at work, the shank being twisted and embossed with a grotesque head and Judith holding a sword and the head of Holofernes. This last was most at Mayence. Now, however, was more interesting for the distinctive character of the work than the Danish and Icelandic spoons. In all of these we noticed the clever adaptation of material for gems for ornament; the sashill spoon or the fir cone being carved upon the top of the shank, and in others cable-work of the most intricate kind. One of the spoons of Copenhagen work, 1587, with the initials enclosed by a wreath, and the letters S and D, to denote "son" and "daughter," were very interesting. Three spoons of old Icelandic work date much earlier, probably, and were excellent in point of design and work.

The saltcellars were specially noticeable as by the finest of any belonging to the ancient colleges and halls. First among these were the four grand old salts, once the property of the Society of Serjeants Inn, known so long ago as the Fire of London as "the old salts," the set consisting originally of five, the top salt having been bought by a knight about 1500, and the bottom of ricia. These are of plain silver, nearly 4 inches high, circular in plan, and in form of a dwarf foot-glass shape, 24 inches in diameter. The date of their making is de de date-mark by hand cleaning, but "Her Majesty's Lion" remains on the under surface, so that they are not earlier than 1550. The "Bacon saltcellar" is a tall salt, parcel-gilt, and profusely ornamented with excellent Tudor work in fruit, foliage and dolphins, and on the foot is engraved in Lombardic characters, "Nicholas Bacon, 1560." It bears hall-mark 1555, and measures 7½ inches high. Nicholas Bacon was the famous Lord Keeper and patron of Francis Bacon. Another salt of unique design and excellent work of the early seventeenth century, was a double, high-standing saltcellar, in silver, the body cylindrical, with a cover ending in a pineapple, and supported by four chimera on griffins' legs, the rim enriched with Elizabethan borders, standing about 15 inches high. This very elegant piece bears the London hall-mark 1620. There were two mazer bowls in the collection, one made of the maple wood, from which the bowl is thought to take its name, the other being called "maeser" in Dutch, and "masern" in Celtic, while Spencer in the "Shepherd's Calendar" alludes to the mazer bowl wrought of re male warre." The other was of silver, and considered to be Irish work of the fifteenth century. This was a bulbous bowl, ornamented with a twisted oak leaf, having two handles and eight bulbs, and is a very curious example. The wooden bowl resembles the two belonging to All Souls College, Oxford, which are known to be of the fifteenth century, as the gift of Archbishop Chichele, 1442. It is ornamented with a rim of silver in dancework having a boss inside, on which is engraved a warrior's head with helmet. The date is considered to be the end of fourteenth or beginning of the fifteenth century. The most rare and interesting object actually found in Norfolk, where it had long been used as a money-box.

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Curiosities of Clocks and Watches.

By EDWARD J. WOOD.

Continued from June Number.

Nicholas Facio, of Duiller, a mathematician, who was born at Geneva, or Basle, on February 16th, 1664, is said to have first invented the application of jewels in watchwork, to diminish the friction of the pivots, at the beginning of the last century. The experiment was, however, tried much earlier. To Facio belongs the merit of having been the first to discover and apply the art of piercing rubies, to receive the pivots of the balance-wheel, prior to, or about, the year, 1700. In the *London Gazette* of the 11th, 1704, we read: "Her Majesty having granted to Mr. Nicholas Facio, gentleman, of the Royal Society, Peter Debaufre and Jacob Debaufre, watch-makers, her letters patent, &c., for the sole use in England, &c., for 14 years, of a new art invented by them, of figuring and working precious or common stones, crystal or glass, and certain other matters, different from metals, so that they may be employed in watches, clocks, and many other engines, as internal and useful parts of the engine itself, in such manners as were never yet in use. All those that may have occasion for any stones thus wrought, may be farther informed at Mr. Debaufre's in Church Street, near St. Anne's. There they may see some jewel-watches, and some essays of free watches and wholly free watches, and all belong to the same art." The inventors Facio and the two Debaufres, were not satisfied with their fourteen years' patent, and therefore they applied to Parliament for an extension of the term, and also for an Act for the sole monopoly of the art of clock and watch jewelry. This application was opposed by the Clockmaker's Company (judging their own chartered monopolies in past times), and the matter was referred to a Committee of the House of Commons, who decided against the applicants. In the journal of the company are the following entries relating to this affair:—

1704, December 11th.—"A Special Court was called upon the occasion of Nicholas Facio, Peter de Baufre, and Jacob de Baufre, having petitioned the House of Commons for an Act for the sole applying precious and more common stones in clocks and watches, and for the enlarging the term of their patent. Their reasons for such an Act were read, as also reasons of several members of the Court by way of answer, and it was ordered that the Master, Wardens, and Assistants should petition Parliament and oppose the Bill."

1705, January 5th.—"The Master reported there has been a constant diligence used in obstructing the Bill in Parliament, brought in on the petition of Nicholas Facio, Peter de Baufre, and Jacob de Baufre, for the sole supplying precious and more common stones in clocks and watches, viz. That Parliament had been petitioned against the Bill, and that the petitioners had been heard by Counsel before the Committee on the Bill, who had made such amendments to it that they thought it best to destroy it, and had therefore struck out all parts thereof save the words, 'Be it Enacted,' and reported accordingly." The Master also acquainted the Court, that in the proofs brought against the Bill there was an old watch produced, made by Ignatius Hinggeford, which had a stone fixed to the cock and balance work, that was of great use to satisfy the Committee; and it was ordered that the Rentier Warden do have the said watch, on, to be kept for the Members of the Court. The same was bought accordingly of Henry Mason, for 24. 10s. he having bought it of Henry Seal, and it was placed in the Master's hands."

There seems to be a touch of sarcastic humor about the passage we have italic-

ized above. The watch purchased by the company was exhibited by them to the Society of Antiquaries of London on June 8th, 1848. It was made before the use of the pendulum-spring, and had a large amethyst mounted in the cock. Hinggeford was a London maker. A manuscript, published in 1794 purports to convey the "Reasons of the English Clock and Watchmakers against the Bill to confirm the pretended new Invention of using precious and common Stones about Watches, Clocks, and other Engines;" and another contains "Reasons humbly offered by the Jewelers, Diamond Cutters, Lapidaries, Engravers in Stones, &c., against the Bill for Jewel Watches."

By the Camden Society's "Original Letters," vol. xxi., we find that Dr. William Ouburn wrote to Richard Towneley on March 28th, 1705, as follows:—"The new contrivance of applying precious stones to watches I had the good fortune when Mr. Facio, the inventor, and an ingenious man, and Mr. Debaufre, the workman, presented their watches, to have the approbation of the Royal Society. I found they had a better opinion of their invention than I could have for I never thought it to deserve an Act of Parliament. . . . One of those contrivances, Facio, number 1 I saw some years before in a large wooden house watch contrived and made by one Mr. Westel, an ingenious gentleman in London."

Facio seems to have been a good scholar, and an ingenious man. Bishop Burnet, in the first letter of his *Travels*, dated September, 1685, speaks of him as an incomparable mathematician and philosopher. In 1687 he came to England, and made the acquaintance of Sir Isaac Newton. He was a teacher of mathematics in Spitalfields, and being early one of the French prophets, he employed his pen with some success, and much appearance of piety in their behalf, becoming their chief secretary, and committing their warnings to writing. 1701 Dr. Ames, one of their brotherhood, having lately died, these impostors gave notice that he would rise again within a fortnight. Guards, however, were placed at his grave to prevent any tricks being played. At last Nicholas Facio, John Debaufre, and Elias Marini were taken into the charge of the French churches in London, and sentenced by the Court of Queen's Bench to stand twice on the scaffold at Charter Cross and the Royal Exchange, with a paper denoting their offence, as disturbers of the public peace and false prophets. Facio was too lavish in the prosecution of inventions and projects, which never repaid him. He died at Worcester in 1733. Many of his original letters and papers are in the British Museum; and among them is one of his Latin poems, entitled "N. Facii Duellerii Auricularis Throno-Servatus," in which he claims to himself the merit of having saved William III. from the hands of the French by a stratagem of Count Feni, a Piedmontese, which Facio fortunately rendered abortive in 1696.

In the beginning of the poem, which contains a curious narrative of the whole affair, he lengthily and not inelegantly describes the jewel-watches of which he claimed to be the first inventor. In the South Kensington Museum is a gold watch in a chased and embossed outer case; the gold dial is also chased. The maker's name is Debaufre, of London. The diameter is one inch and three-quarters. This watch was purchased at the Bernal sale for 112. 10s. Mr. A. J. B. Bessford Hope has a square green enamel watch, with a painted dial, the maker being Debaufre, of London. Probably both of these watches were made by Facio's co-patentees; although the orthography of the names differs.

Besides the above Mr. Hope has also a gold repeater-watch, with a chased outer case, the subject being Jupiter and Juno. It is of the eighteenth century, and the maker was Herrmann, of Neuburg. Also a silver repeater-watch, with white enamel dial, the maker being Boursault, of the same period. Also a gold watch, with complicated movements, and dials on the back and front, the date being the same as the above.

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Official List of Patents

PREPARED EXPRESSLY FOR THE JEWELLER'S CIRCULAR.

Issued by the U. S. Patent Office for the month ending Sept. 4th, that relate to the arts and manufactures represented by the JEWELLER'S CIRCULAR.

116,781—Stem Winding and Setting devices for Watches.—Louis Kahn, New York City.

BRIEF.—A lever, operated by the sliding stem, has two projections; one for moving the sliding crank and holding it in its position while winding, and the other for automatically releasing the clutch by closing the case.

116,800—Clock Calendars.—L. S. Kellogg, Leon, N. Y.

BRIEF.—The lift-bar is carried up by the revolution of the hour-hand shaft, and actuated by its connecting devices, the ratchet-wheel carrying the calendar, the incline below the notches permits the bar to drop to its first position.

116,811—Crucibles.—John Feix, San Francisco, Cal.

BRIEF.—A crucible of ordinary construction is provided with a ring or annulus of the same material to fit the mouth or top of the same, forming a continuation of said crucible, to hold the loose metal or ballion placed therein, thereby preventing the ingress of oils, or the loss of metal by spilling.

116,722—Setting Gears.—Thos. W. Fry, Providence, R. I.

BRIEF.—The receiving-cup protects the gem from dust, &c.

116,830—Escapements for Watches.—J. R. Hopkins, Washington, D. C.

BRIEF.—A stop mechanism, as set forth in the claim, is employed to prevent overbanking of the balance.

116,786—Stem Winding Watches.—John D. Broz, Brooklyn, N. Y.

BRIEF.—A coupling piece connecting the winding-screw with the stem permits removal of the movement from the case without disturbing the stem.

116,818—Barrel Arrows for Watches.—J. R. Hopkins, Washington, D. C.

BRIEF.—A going barrel attached to or upon a staff which works in a hollow winding arbor, and has its principal barrel in its name.

116,774—Watchmakers' Boxes.—Phillip H. Wheeler, Rockford, Ill.

BRIEF.—A transparent glass box for watchmakers, composed of two parts, and a packing-ring.

116,904—Eye Glasses for Watchmakers.—M. W. Wierd, Waukegan, Ill.

BRIEF.—A combination of the lens, eye tube and expanding ring, as set forth.

116,901—Tower Clocks.—Chas. Fashold, Albany, N. Y.

BRIEF.—In the tower-clock, the driving mechanism of the hands is arranged separately from the clock train, the connection of the parts being such that any irregularities of the movement will not affect the operation of the train.

116,027—Jewelry Pins.—J. B. Abrahams, New York City.

BRIEF.—The combination with the pin and indented post hinged together of a slotted shell enclosing said post.

116,818—Devices for Winding Clock Eugene Farcot.—Paris, France.

BRIEF.—In combination with the main-spring barrel of a clock-movement a second spring barrel, in connection with the main-spring barrel, by means of a pawl and ratchet and a cord and ribbon on said second barrel, so roller drawing on this cord, simultaneously winds the spring in both barrels, the main-spring to drive the clock movement and the second to rewind the cord.

Musical Boxes.

Messrs. M. J. Pallard & Co., the well-known manufacturers and importers of Musical Boxes, have recently introduced in instruments of their make several new and valuable improvements for increasing the volume, purity and brilliancy of tone, and giving more accuracy of musical expression in the different shades. By an ingenious combination of cylinders, arranged at the extremities on a revolving disc, the box is rendered capable of playing a greatly increased number and variety of airs. As each roller completes its allotted number of turns, another is carried by the action of a simple lever attachment into its proper position opposite the comb and so on until three, four, or even six rollers have run off their tunes. The cylinders that are not in motion are held at rest and can be put in action at pleasure. There is a dial attached to the end of each cylinder, with numerals, giving a key to the name of the tune the instrument is playing. This improvement in the adjustment of cylinders renders the instrument capable of numerous changes in melodies, which can be almost indefinitely increased according to the number of cylinders introduced at a comparatively trifling additional cost. Another feature worthy of mention is the arrangement of a combination comb. Prior to this invention musical boxes were provided with but one comb, from which but a feeble and unvaried sound was obtained. A greater number of prongs or vibrators were introduced, duplicating the same note and of course adding no harmony. This interfered somewhat with the purity of the vibration, and caused the effect of producing harshness and discord. The new combination of combs effectively remedies these imperfections. The improvement consists in combining two or more combs, the note or vibrations of which are of similar pitch, with two or more series of scales on each segment of combs. These several combs take a separate part in the harmony and thus richness of effect is produced hitherto unimagined. In all musical boxes the scale of notes differ from that in the piano, for in the former instrument the notes are necessarily raised or lowered the pieces the box is intended to play are embodied in the instrument and the action of the prongs prevents its being again operated upon by the plates projecting from the cylinder, it often occurs that two or more similar notes are embodied in one scale, so that they may be repeated quickly one after another as occasion may require. There are several other improvements introduced by Messrs. Pallard & Co., which we may mention in some detail.

Meanwhile, we congratulate this well-known house on having solved the problem of securing the instrument of the greatest variety of expression, which now renders the musical box an instrument of pure art and delicacy almost rivaling those which respond directly to the master's touch.

Morrison's gold and silver solutions, for electroplating without a battery, are invaluable to every watchmaker and jeweler. They require no elaborate preparation for use, are easily applied, and afford a uniform and substantial plating to all articles treated. Our readers on the Pacific Coast can procure them from S. Farjon & Co., 418 Third street, San Francisco, Cal., and also to the Gulf States, from Koch & Dreyfus, 26 Chartres street, New Orleans, La. They are also for sale by the leading musical dealers throughout the United States and Canada, and by D. Horwitz & Co., 414 Madison Garden, London, England.

Mr. Fritz Jaeger, representative of the house of Jaeger Peres, 31 Nassau street, has recently returned from Europe, having made arrangements for the exclusive control of all the watches and movements of this celebrated make, manufactured for the American market. Mr. Jaeger's traveling agent, will shortly start on a trip through the west with an extensive assortment of gold and silver watches, chronographs, split and quarter-seconds, &c., to which we would call the attention of our readers.

Brainard's patent Locks, manufactured by the well-known firm of Brainard, Steel & Co., 9 Maiden Lane, have achieved a widespread popularity, they embrace a variety of patterns, beautifully designed and exquisitely finished and are of solid 14 karat gold. We take great pleasure in directing the attention of our readers to the firm's advertisement which appears in another column.

Messrs. L. & M. Kahn, of this city, have been granted a patent for an improved winding and setting attachment for stem-winding watches, we have not space at this time to go extensively into its details, but will do so in a future number.

Mr. Le Bouillier, of the firm of Le Bouillier & Biele, has returned from Europe with a large and varied assortment of rich fancy goods, clocks, bronzes, &c., from the principal markets of Europe.

Mr. Benton, of the late firm of Benton, Andrews & Co., has been appointed the agent of the New York Celluloid Co., of which Mr. Silcock, of Messrs. Silcock & Cooley, is president.

Mr. George Zucker is the most extensive manufacturer of hard and soft Rongis in this country—parties in search of the goods in office would do well to consult his advertisement.

Messrs. Benton, Andrews & Co., have dissolved partnership. Mr. J. P. Andrews will continue the business, and settle all claims against the late firm.

The self-adjusting Telescopic Bracelets, introduced by the American Bracelet Co. of Providence, are highly spoken of by jobbers.

Mr. J. H. Johnson, one of the most enterprising of our city jewelry collectors, has a collection of old paintings to be found in any private gallery to town.

A tower teaset, formerly the property of Gen. George Washington, is now in possession of a family at Gansweert, N. Y., where it has been for nearly a century. It is found in the battle-field of Saratoga, in a hollow stump.

CROSS & BEGUENLY.



P. O. Box 531.

21 Maiden Lane,

NEW YORK.

ALFRED F. CROSS
WATCHES, JEWELRY, &c.
46 Rue "Leopold Robert."
Chaux de fonds, Suisse.

Importers of Swiss Watches,

Watch Tools and Materials, Silk Guards, Watch Glasses, &c.

Agents for the Drexel & Perrot Stem Winding Watches.
HORSE TIMERS \$18 AND UPWARDS.

DEALERS IN ALL GRADES OF AMERICAN WATCHES.

L. A. LUTZ, Successor to

LUTZ BROTHERS,

Manufacturer and Importer of

WATCHES

OF EVERY DESCRIPTION.

Factories in LOCLE and GENEVA, Switzerland.

Fine Movements a SPECIALTY. 1 second, Chronographs and Extra Fine Silver Watches always in Stock. Goods sent on approval, satisfactory N. Y. City references being furnished.

Represented in New York by EMILE J. DERAISMES,

71 NASSAU STREET, Cor. John,

P. O. 2630,

NEW YORK.

NICOD & HOWARD,

Importers and Manufacturers of WATCHES,

SOLE AGENTS FOR THE

TRADE MARK.

Nicoud & Watch.

N° 76

14 John Street, New York.

ARNOLD NICOD.

P. O. Box 2209.

H. HOWARD.

F. H. MATHEZ,

Manufacturer and Importer of

WATCHES & MOVEMENTS

OF STANDARD REPUTATION AND QUALITY.

Desires to inform the Trade that he has recently made arrangements for the production of a full line of Gents' and Ladies' STEM-WINDING and STEM-SETTING WATCHES and MOVEMENTS—all 34 plate.

These Movements are uniform in size and interchangeable in parts. It requires therefore but a small assortment of Cases to keep a full stock, and parts of all kinds will always be kept on hand to supply the demand.

For Samples, for examination, will be sent on application, accompanied by satisfactory references.

No. 5 Maiden Lane, New York.

Jeweler's Circular

AND

HOROLOGICAL REVIEW,

A Journal devoted to the interests of the Watch and Jewelry Trade of America, and the organs of communication between all buyers and sellers in this particular branch of business.

This Journal will be forwarded to any address in the United States and Canada, for \$1.25 per Annum, payable in advance.

Correspondence solicited from all parts of the country, on subjects pertinent with the aim and object of the paper.

All communications should be addressed

D. H. ROBINSON, 320 Pearl St., N.Y.

Our Agencies.

Those who are not as yet our subscribers can obtain copies of this Journal by addressing any of the following gentlemen, who have kindly consented to receive subscriptions and advertisements for the JEWELER'S CIRCULAR:

W. W. WILCOX, Chicago Building, Chicago, Illinois.
THE PHILADELPHIA WATCH CO., 618 Chestnut Street, Philadelphia, Pa.
E. K. R. COOK, 113 Washington Street, San Francisco, Cal.
S. E. ALLEN, HERBERT, 20 Muralin, Havana, Cuba.
S. E. LINDO DEPULE, Mayaguez, Porto Rico, West Indies.
MAXUEL Albarada, Buenos Ayres.

NEW YORK, SEPTEMBER, 1875.

SPECIAL NOTICES.

A FINE RECIPIENT FOR SALE. Cost originally \$100. In perfect running order. For particulars apply to J. W. WILCOX, 320 Pearl St., N.Y.

WANTED. A watchmaker, who has had 10 years experience in England, and has been in the watchmaking business in this country for 10 years. Apply to J. W. WILCOX, 320 Pearl St., N.Y.

A YOUNG MAN having considerable experience, desiring a situation in a watchmaking establishment, best of references. Address W. W. WILCOX, 320 Pearl St., N.Y.

FOR SALE. A fine watch, of an old style, with a gold case, and a gold chain. For particulars apply to J. W. WILCOX, 320 Pearl St., N.Y.

FOR SALE. A fine watch, of an old style, with a gold case, and a gold chain. For particulars apply to J. W. WILCOX, 320 Pearl St., N.Y.

WANTED. A situation by a thoroughly competent watchmaker, who has had 10 years experience in England, and has been in the watchmaking business in this country for 10 years. Apply to J. W. WILCOX, 320 Pearl St., N.Y.

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not compass the difficulty until we make up our minds that expectation is keyed too high. It is out of the question that we shall have for many years such seasons of large purchases and high prices as those of 1865 and 6, and the sooner we get over this absurd notion the better. We need to cultivate now a steady, natural trade on a sound, cautious basis, and that is the infallible recipe for hurrying up the reasonably good times which we desire.

To bring this about, most branches of business, and notably our own, sadly need weeding. The "fast" days of the war have been the best of the business. We every branch of trade a number of people, without capital or business character to speak of, who the present dull times are getting the best. Others, seeking something to do, start in whatever business they happen to hit, and get what credit they can from houses anxious for trade. Instead of shutting down on these people, in self defence, such houses encounter risks and experiments that can only end in one way, and not only lose their money but harm other dealers who are worthy of credit and are their competitors. It will become every manufacturer and every jobber, at this crisis, to scan critically every thing he makes, and shut down utterly on irresponsible buyers.

Nor can any house afford to play "follow my leader" in this question of credits. That is already a dangerously favorite game of the trade. If Smith sells Brown \$1000 worth of goods, Jones must sell him as much more as he can, with no further knowledge of Brown's standing than the fact that Smith has sold him. Or Brown proposes to buy a bill of goods of Jones. Jones sends across the street and learns from Smith that he would sell Brown to any amount. Accordingly he sells the goods, and it has happened in such cases that Jones's first word from his new customer is an apologetic notice of assignment, and that he has been forced to pay for these cases, but that Brown and Smith may be in collusion? And if this be not the case, what sort of business wisdom is it that Smith should have sold him, at hazard—commendation of one house?

It is common sense and arithmetic that we can't get to "hard pan" until we get down to the bottom of the business. Too much business, but have your bills paid, and make those sales return a profit. That sums up the whole matter, and those who act on this principle are the safe men of the trade.

Merchandise Agencies.

It is well known that the general mercantile agency system is becoming more and more unpopular among shrewd business men, and that special agencies for special trades are in their place gradually running their way into commercial favor. The dry goods, the hardware, and now the jewelry trades have already taken the hint, and have organized agencies for their own, in which the facts as to the standing of men in their respective trades may be more thoroughly and accurately ascertained than by the general agency system. The present favor is the collection of this information under the authority of and by an appointee of the trade organization.

It must concede, however, that where a competent manager is employed, and where the travelers and other agents of the wholesale houses are directed to place their services under his eye, they may learn, the likelihood of such reports as may thus be furnished being well-based and authoritative is very much greater. One has only to read the reports of the general agencies in respect to our own trade to satisfy himself of the utter worthlessness of many of the ratings of jewelry dealers, and we doubt if even in these careless days, the most careless house in the trade would venture to risk a bill of goods on their authority. This is a natural result of the usual organization of these general agencies, which have usually one local agent, either a lawyer, who has a little derived knowledge of commercial standing, and the work is simply in the hands of the agent, who is in no permanent and not personal interest. In this way, names have again and again been found on the books whose owners

were dead and buried long ago. The general agencies, attempting to cover the ground, are too big a job for them to handle. They cannot even afford to pay for the active and increasing local work that is required in so many thousand places.

On the other hand, the trade, and in particular every traveler, is most directly interested in knowing everything about the character of the men with whom he deals, which affects his commercial standing. As a body, no facts, we may say, escape the travelers. Their advantages are infinitely superior to those of the local agent, and they gain also, from neighboring dealers, the information of the local agent as well. For these reasons we believe that the special agency system, under the immediate control of the trade itself, will work great good—especially when managed by the trade itself. It can certainly be made reliable, and a sensible system on which credits can be based is, especially just now, one of the chief wants of the trade to bring it out into "good times," where it is important to the traveler to get into credit with the wholesalers, taken together, do not know through and through, so far as his commercial existence is concerned, and with the same ignorance of his movements in the trade, he is "brought down to a fine point." We trust therefore that the members of the trade will support the special system, as well as affording it all the information they can and by directing their travelers to do the same, as by preferring its reports to those of the imperfect general agencies.

Swindles on the Trade.

In the nature of things the jewelry trade is a favorite resort for those gentlemen of leisure who prefer absorbing other people's property to earning a living for themselves. There has been a crop of swindles on the trade during the past season, and we warn the trade that during the coming season they will increase alarmingly. It is worth while therefore to record some of the phases which the business has lately put on.

The practice, for some years past, of some rascal had got hold of old bill-heads of the present house of Coe, Pinneo & Stevens, and one day last month a telegram, which ran as follows, was received by Mr. Ferdinand Blankenhorn, Assistant Cashier of the Third National Bank:

LONG BRANCH, N. J., AUGUST 14, 1875.
I am indebted to Coe & Stevens, of Manhattan, for some jewelry; have instructed them to send bill to you; please pay; it will not exceed \$1000.

C. M. FORDMAN.
The practitioner had bungled, for Mr. Jordan, who was the cashier of the bank, was stopping on Long Island. The forgery was detected immediately, and detectives summoned. Early in the afternoon an individual, who gave his name as John Martin Brennan, inquired for Mr. Blankenhorn and presented the following bill:

To Coe, Adams & Co., Jewelers, No. 7 Maiden Lane.
1 solitary diamond stud, 44 carats, \$400
1 set lady's ear-rings, 24 carats each, . . . 300
1 lady's gold ear-ring and diamond stud and chain, 280
Total, \$980

The swindler was locked up, and in his possession were bills for jewelry supplied to August Belmont and F. F. Thompson, purporting to come from the same house. An attempt was made to get the successful swindle was attempted upon the Importers' and Traders' Bank by another operator.

The jewelry store of Messrs. Calvin Kline & Co., Williamsburgh, was recently robbed of more than \$5,000 in money and goods. A man came in with a watch to be repaired. When Kline was examining the watch, the man, who was dressed in a suit, and at length he said, impatiently, that he had not time to wait, and was off. In a few minutes Mr. Kline went back, and found the watch gone, and in its place the following-described property was missing: One pair of five-carat diamond ear-drops, \$3,000; one diamond ring,

\$1,500; two diamond rings, \$125; one diamond ring, \$225; one gold bracelet, \$40; six amethyst rings, \$80; each, \$100. The robbery was effected by a confederate entering by the residence door at the side, and then the thief, who had been in the house long enough to make sufficient noise to prevent his pal from being heard in his operations on the safe, which was open. This showed that the jewelry store was a safe place, and a safe place for goods to be kept on sight.

An exceedingly accurate jewelry dog, not especially skilled in the trade, but nevertheless worth calling attention to: "There has been a new game in swindling brought out by the gents who visit railroad trains to ply their wares. A sharper in the car has a mammoth gold ring on his finger, which he drops on the floor. After considerable trouble it is found, and he remarks that it is quite valuable. He is fearful that he will lose it, as it has dropped off his finger several times. He is willing to sell for \$5 or \$10, rather than run any more risks of losing it. Somebody buys it for the sum named, and finally he ascertains that he has almost metal enough in it to start a brass foundry." That's what a customer gets for his money.

But the methods of swindling are infinite, and a jeweler must be wary against old-fashioned new ways in which the thieves of the present day are endeavoring to be let of sight by any cautious tradesman.

Orders for the Holidays.

Those of the trade who make use of the *Jeweler's Circular* will keep in mind some experience of last year by which we advise them to profit this. A great many dealers through the country, much to their regret, were forced to let holiday purchases go by—and of course lose them altogether—because they put off ordering their holiday goods till the last moment. It is not probable that they will increase upon the manufacturing houses in this city just a day or two before Christmas which was utterly impossible for them to fill. The most anxious buyers, however, were especially elbowed with such orders. It is in fact impossible, in the nature of things, to do half the business of the year in the week immediately preceding Christmas.

It must not be forgotten that even if the goods required are in store in New York, the carelessness with which fine goods must be packed necessitates a considerable delay of itself. The whole force of the shipper is as busy as can be already, and he can only add new and green hands at serious risk of damage. At that time also all the means of transportation are choked up by the rush. Then again, a retailer will order special goods not kept in stock, which must be had from the manufacturer, and for an item of this kind, the whole order must be held back. To keep all combinations of pattern, ornament and finish in goods in store, and to have orders for them, and to have orders just at the rush, would require such investment of capital as to take out the profit from any business. Consequently the buyer who orders earlier, the season gets his choice and may select or order just what he wants, while the late buyer must take what is left.

The most anxious buyers are already sending in their orders for the holiday trade, and getting their lamps trimmed in time. They thus secure the most desirable stock, which is in no hurry and therefore finished with all the care and attention in good order and have them ready to attract trade when the holiday season begins. We commend their example to the trade.

Editorial Jottings.

We should be waiting in courteous appreciation of a kindness did we not acknowledge the handsome way in which the *New York Evening Mail* speaks of this *Jeweler's Circular*. It says:—"The July number of the *Jeweler's Circular* contains a very interesting article upon the Bryant competition between the leading silversmiths of the country, with magnificent

plates illustrating the different vases. There are also able articles upon subjects interesting to the public and the trade, and pleasant gossip as to the latest ideas and modes in gold, silver and metal processes. Mr. Hopkinson has made his periodical one of the best trade journals published, and we do not wonder that it has been quoted with approbation, in England and Europe; or that articles have been reprinted in such papers as the *London Times*. Good work is sure to make its way, and so it has been in this instance, for *The Jeweller's Circular* is acceptable to the public as well as to the trade, and is always a welcome and well-informed visitor.

If times are not lively, the drummers are. They are determined to stir up trade, and everybody in it. Mr. Clemens O'kamp, of Cincinnati, has a general reputation through the trade—unfortunately for him just now—of being a large as well as safe buyer. One day last month, he arrived from Europe, with his son, and registered himself under his own name at the Merchant's Hotel, in Courtland Street. No sooner did his arrival get out than the hotel was besieged. Forty-seven florists and many alchemists joined in the campaign by sending up their cards, and at one time during his stay it is reported that nearly a hundred jewelers were waiting to be admitted to room. Mr. O'kamp, however, finally escaped with his life, and is now at home looking after the fall trade.

We have in contemplation such changes in the mechanical style and improvements in the character of the *Jeweller's Circular* as will make it, at least in its external appearance, the finest trade journal in the country, and a rival to any issued abroad. We have received so many kind words and such practical favor from the trade as to encourage us in pressing toward the fulfillment of our ideal for this journal, and about their short continuance, in case as it has for the past year or two, we hope to give them with our new volume a representation to be proud of any where. The *Jeweller's Circular* will be nothing less than a finely illustrated art journal of its speciality, and we trust it will not be long before we realize this ideal.

A few weeks ago five travelers for as many jewelry houses met in a little town in Ohio. There was one retailer in the place, an inoffensive German. Five broad grins overpowered five faces, where upon the boys fell in line and marched in a body to the only store. The poor watchmaker would scarcely wait with his importunities, and next morning was seen on his way to the depot with a double-barreled shot-gun and a six-shooter. Fortunately the targets had left by the night train, but—"if ever dem fellers comes to my store again mit dere humbunks," says he, "dere will be a schutzenfest in dis town sure."

Good reports continue to come in from the West and South in regard to the different crops. Some damage has been done by local rains and floods, but the harm has been counterbalanced by an increased acreage in most of the States. In view of the early visitations of insect plagues and the later damage wrought by the weather is reason for holding a more than ordinarily joyous Thanksgiving Day at the close of this year's harvest. It may seem a comparatively unimportant thing now, the wheats of the country, commerce and even of our daily life might have been sadly clogged by the continuance of the crop disasters with which we were threatened.

The other day, a dashing young lady, while shopping in the Lane, saw a piece of orange peel on the walk and immediately slipped over the same. Our friend Abessona, with his accustomed grace and politeness rushed to the rescue, and ventured to express the hope that she had broken no bones. The sufferer's look betrayed her true unweariness, as she uttered a suppressed "No—but I feel just as mad as if I'd broken six."

According to a statement in the *Edinburgh*, a week's work in Birmingham comprises, among its various results, the fabrication of fourteen millions of pens, six thousand bedsteads, seven thousand chairs, three hundred millions of cut nails, one hundred millions of buttons, one thousand saddles, five millions of copper or bronze coins, twenty thousand pairs of spectacles, six tons of *poplar-wood* wares, \$150,000 worth of jewelry, four thousand miles of iron and steel wire, ten tons of pins, five tons of hair pins and hooks and eyes, one hundred and thirty thousand gross of wood screws, five hundred tons of nuts and screw bolts and spikes, fifty tons of wrought iron refined, three hundred and fifty miles length of wire, vests, forty tons of ingots metal, forty tons of German silver, one thousand dozens of fenders, three thousand five hundred bellows, eight hundred tons of brass and copper wares—these with a multitude of other articles being exported to almost all parts of the globe.

Trade Cossip.

Amber jewelry is much sought after. English manufacturers consume about 450 tons of ivory annually. All they want now in front of the New Store is a clock.

Mr. J. H. Whitchose, designer for Tiffany & Co. has returned from Europe.

About \$5,000,000 have been subscribed toward the Centennial Building Fund.

Mr. Klein, a jeweler in 4th street, Brooklyn, was recently robbed of a quantity of diamonds.

James Henry and John Hall, the two notorious diamond smugglers, have been remanded for the trial of the Grand Jury.

Shell cameras are again becoming fashionable, a fine selection of these goods may be seen at Boscley, Harbey & Graham's.

London, Paris and Vienna fancy goods manufacturers have introduced but few novelties this season in consequence of dull times.

Lockets are universally worn; the newest designs are heavy and expensive, precious stones being extensively used for ornamentation.

It is estimated that there were over a million dollars worth of coral obtained last year from the Mediterranean by the coral gatherers of Naples.

American jewelry is offered for sale by Yokohama Jewellers. Watches, musical boxes, coral, cutlery, clocks and jewelry, pay an ad. of sixteen dollars of five per cent. on original value.

Intaglios are becoming quite popular. They are in or hollowed out of stone so that an impression taken therefrom would present the appearance of a base-relief, the reverse of a cameo.

The store of H. W. Cinnamitt, pawn-broker, Pittsburgh, was entered by burglars on the evening of September 1st, and a quantity of diamonds, watches and jewelry, valued at \$7000, were stolen from the store.

Rabson, late president of the Bank of California is said to have advanced a large amount of money to the Cornell Watch Co., and at the time of his death, held a large portion of the company's stock.

M. M. Thuermer, of Chaux de Fonds, Switzerland, has recently introduced an improved winding and setting attachment in spring-winding watches. The improvement is said to guard against breakage from over-winding.

Paste diamonds in silver mounting, designed for the belle, shoes, and other lucks, and used to delight the hearts of our great grandfathers, are coming into fashion, and may be seen in the cases of our long retail jewelers.

The Sheffield silversmiths have presented Mr. Pittinell with a silver cup of exquisite and costly workmanship, in token of their appreciation of his humane efforts in securing legislation for the protection of sailors and sea voyagers.

The latest novelty is an ornamental belt sufficiently formidable looking dagger, sheathed in velvet, with a silver handle, and is to be the belt of the fair wearer. The article is called the new dagger fan. The fan is intelligible, and the dagger is probably intended for protection in traveling.

According to Winkler, there are at present four principal manufactures about 35 cwt. per annum. Of this quantity 20 cwt. goes to France and 15 to England. Aluminum is also made in Berlin. The price for a number of years has been \$12 to \$15 per lb. It is not probable that it will be produced cheaply in this country. This fact, with its unchangeability and lightness being three times lighter than copper, four times lighter than silver, and seven or eight times lighter than gold, renders it exceedingly adapted to coin, especially as it is easily coined.

You can pass down or up Broadway, read the new declaration of principles and rules that govern the famous north-east corner of Canal street and Broadway. The Law has changed the color of his posters, and we expect to see the initiators do likewise. Originals lead—copyrights follow.

LeBoutillier & Bride, IMPORTERS, 10 Maiden Lane, N. Y.

NEW IMPORTATIONS OF

FRENCH CLOCKS,

BRONZES, MUSICAL BOXES,

—AND—

RICH FANCY GOODS.

SPECIAL NOTICE.

We are now prepared to submit to OUT OF TOWN CUSTOMERS Photographs of our Goods, in order to give readers the advantage of seeing and ordering the latest designs. These Photographs will give the exact measurement and prices.

QC-Applicants unknown to us will please give city references.

FORMERLY

Shepard, LeBoutillier & Co.

CRYSTAL CHANDELIERS

GILT, BRONZE & DECORATED GAS FIXTURES,

Fine Marble & Bronze CLOCKS,

Bronze Figures and Ornaments in Greatest Variety,
at Low Prices. Manufactured by

Mitchell, Vance & Co.

No. 597 BROADWAY NEW YORK.

"Medal of Special Award" by American Institute, 1872,

No. 719, GAS FIXTURES.

MITCHELL, VANCE & CO., 597 BROADWAY, N. Y.

We find the above-named firm to be the best production in the country and we may say, in our judgment, excelled by no other country in the world.

We recommend a MEDAL OF SPECIAL AWARD FOR CHANDELIERS AND GAS FIXTURES.

(Signed) JOHN W. CHAMBEIS, Secretary.

"Medal of Special Award confirmed."

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PROCEEDINGS OF THE HOROLOGICAL CLUB.

A Distinguished Body of Watch and Clock Makers.

Twenty-third Discussion (Continued from the
Secretary.

PRESIDENT.

The Secretary of the Horological Club and the printers' devil attached to the *Jeweler's Circular and Horological Review*, have frequently come into conflict regarding the correspondence addressed to their Honorable Body, on account of having no regular letter box in which to place communications till called for by *peace now reigns*. Messrs. Le Bonillier & Bride have lately presented the Club with a receipt for letters, and at this meeting the box, which is one of this firm's most recent importations, was passed around for inspection and pronounced admirably adapted for the purpose intended. The design of the workmanship substantial, while the hinges and fastening of the lid excited the highest admiration. The Honorable Body gratefully accepted the gift, and then passed a most cordial vote of thanks to the donors.

Thanks are also due to Mr. M. McKenny for placing a notice of the box in the box. Mr. McK. is well known in the Maiden Lane region of the city, as an expert artist with the brush, and having a practical cast and rapid manner.

THE NEW BALANCE, AND THE FUZZE QUESTION.

The fuzze question was then brought up, and the following paper was the first presented:

To the Members of the Horological Club.

I had intended, after stating my position in the pending fuzze-or-no-fuzze controversy, to leave the field open for other watchmakers to give their views, and their reasons therefor. But having been in a manner called upon to do so, I will answer certain points in your last month's

Mr. Clerkenwell inquired whether, in testing my new balance by practical trials, I would choose a going-barrel in preference to a fuzze, to present, so that I would say that it is applicable to either, indifferently, as its design is simply to secure a perfect compensation for heat and cold, which will of course be done regardless of the isochronal qualities of the hair-spring. But if I wished to make a perfect time-piece, with the least amount of labor, I would prefer the fuzze movement, because its hair-spring could be more easily isochronized, as explained in my letter of last month. Nevertheless, with a little more trouble, the going-barrel movement could be made to give equally good results. And any one wishing to experiment with this balance may confidently apply to any movement-maker, or jeweler, provided only that it affords room enough for a little thicker than those of the ordinary construction.

I suspect, from Mr. McFuzze's criticisms on my last letter, that he is a shy one, and fond of a joke; for he says that, in order to be a fair trial, the two classes of watches should be exactly the same in every respect, from the balance to the chain.

The only point of difference being that one should have the fuzze and chain while the other had the going-barrel—and that in that way only do we test the comparative advantages of the two. Even then, there is no doubt that the latter movement would prove equal to the former if its hair-spring were properly isochronized. But this is evading the real point at issue. The question is not as to the comparative advantages of the fuzze and the going-barrel of fuzze and the going-barrel watches. The usefulness of the fuzze is equalizing the power of the mainspring, a conceded by all. It is not questioned, nor is it questioned, but by means of various valuable devices, as by modifying the train, finer gear and improved pinion action, quick beat, etc., we get ad- vances in construction of watches with going-barrel, which are considered to equal the fuzze and chain. But Mr. McFuzze

very soberly proposes that we relinquish all these good points of the going-barrel watch, in order to see whether *without them* it is equal to the fuzze watch, and by such a comparison it is evident that the better kind of watch. Was friend McFuzze in earnest in this, or was he planning to steal a march on his unsuspecting opponents? Let us see fairly play all around, for at no adjustment is equal we reach a conclusion that will stand.

He also speaks of the necessity for the impelling and controlling forces of the movement to be equalized and to be kept as nearly balanced as possible. That *even* necessary, before the isochronal adjustment of the hair-spring, but it is not necessary now, for at no adjustment is equal of compensating for all the inequalities and irregularities that will ever occur in a well made movement. If it does not do so, it is the fault of the workman, not of the watch. But as "Exceller" intends to state his views on isochronism this month, I have considerable curiosity to learn on which side he will give the weight of his authority.

Before closing I wish to disclaim any intention, in my last letter, of questioning the ability of our estimable friends, the running of the different classes of watches passing through their hands. But as the results of the Neuchâtel trials had been so easily imagined, and set aside by our Fuzze friends, and as individual watchmakers could scarcely have equal facilities, opportunities, and time for making such trials, I am glad to see that the principal firms of watchmakers throughout the country. Their records would, of course, be fully credited, and no one would be moved to see them published to test the self. Such records would also meet the further objection of Mr. McFuzze against the Neuchâtel trials, that the time of the trial was not long enough to show the real value of the two classes of watches. Theoretically considered, there appears to be no reason why a first class going-barrel watch could not be made to perform as well in every respect, under any circumstances, as a first class fuzze watch. And if our best watchmakers have found nothing to be gained, so, in practical use, (as I know that) they have found more can be wanted? Mr. McFuzze certainly states his side of the case with remarkable shrewdness and tact, but I think the weight of evidence and opinion will prove too much for the Fuzzeites to withstand, and that they will be forced to moderate their claims.

C. E. FARR.

Mr. McFuzze then rose and assured their honorable body, and their respected correspondent, that he had been in dead confusion, and intended in the open straight forward manner he had always done, to defend the use of the fuzze in fine watches to the last, and that, without attempting to do so, he would not have undertaken advantage of those who differed with him on this subject. There was no necessity for the advocates of the fuzze to lower their claims, or to make any claim, but their opponents were making all the pretense is, when they insisted that a watch, without the despised fuzze, could be made to run as well (some claiming better) than one having a fuzze. There was nothing surprised him more during this discussion than the stress the anti-Fuzzeites laid upon the fact that the fuzze toothed train of wheels and pinions, because in his mind the same arguments which tried to make out that a variation in the motive power of the fuzze could also be applied to the transmission of that power, from the centre wheel up to the escapement. In other words, if it was not necessary for the motive power to be equal, neither was it necessary for the fuzze to be equal. Fine toothed trains had no advantages many supposed. Fine teeth did not receive power so accurately shaped as ones had to be made, but that was about all that could be claimed for them, providing the numbers were not too low. For himself he wanted a fuzze to equalize the

force of the mainspring, a train of wheels, and an escapement to transmit that force to the balance with the greatest amount of regularity attainable, and instead of using the isochronism of the spring for purposes which may be avoided, he desired to employ it solely to counteract the irregularities of friction oils, and other defects which are unremovable.

A very able paper from Mr. Sandoz was then submitted—

FUZZE VERSUS GOING-BARREL.

To the Members of the Horological Club:

Your August number has reached me; full as usual of good things and general information. I have read with interest Mr. Muna's sign articles I will do the same, as I am used to look my own opinions and always had a liking for open and square discussion. I now propose to answer in detail the arguments of the Fuzze party, commencing with the Hon. McFuzze member of the distinguished Horological Club. He expressed the opinion that it is not possible for a mechanical watch to have possibility for a going barrel to equal the fuzze as means of transmitting motive power. Now, if there was only two factors in the transmission of motive power, the motive force, his logic would certainly be unanswerable, and here would end the discussion; but the question is: (as I understand it) about the possibility of the *over the going-barrel in pocket time keepers*. In this class of instruments space is very valuable, and to enclose in the same space the mechanism of the largest wheel, the highest numbered pinions, the largest barrel, and the largest balance has always been the aim of those who make a specialty of this delicate performance in time keeping. I do not suppose Mr. McFuzze will deny that either and all of these points contribute to improve the time-keeping of a watch. Now, if he is prepared to assert that the cramping and squeezing produced by the use of such a large wheel as the fuzze is not a detrim- ental quality of the watch, and that the movement to which it is attached is not improved, he will deny so patent a fact.

The question is then reduced to this: Has not the fuzze, as a motive power, as transmitted by the fuzze, sufficient advantage to overcome the inferior transmission of the same power through the remaining qualities of the watch? When considering this question, it will be necessary to examine again in detail the effect of the several disturbing influences which we have to contend with in horology. Suppose, for instance, that the fuzze could produce an absolute equality of motive power, we have yet to counterbalance the unusual amount of force received by the balance on account of the varying density of oil, hence the necessity of causing ship chronometers to gain in the small vibrations, this same necessity exists also in pocket chronometers, hence, with or without fuzze, we have to isochronize the vibrations, the labor is then equal in both cases. Again, the mainspring loses some elasticity in the long run, and this loss, this causes an alteration of the rate from year to year; but the fuzze does not provide for this. In the case of adjustment to position it is done with or without fuzze equally well. The only point left is the going barrel would be at a disadvantage in reaching isochronism. Now, let us suppose a going-barrel watch which, having been through the Fuzze trials, is found to be perfectly isochronous, keeping exactly the same time in the large vibrations, which we suppose to be one-and-a-half turns of the balance, and small vibrations, representing one turn of the balance. Now, suppose that in such a watch a fuzze is added, everything else remaining unchanged, what will be the result? Well, the watch will keep for absolutely the same time, only the vibrations will be of the same amplitude. Under both styles of motion the rate of the watch will vary when the oil thickens, when the mainspring loses its elasticity, when the positions are altered, and in all cases will be the same.

But it has been supposed that the fuzze had been added without altering anything in the time-piece previously barrel geared, of course this is impossible and will have

to submit to a reduction in the balance size, and in all the working parts of the watch. It remains for Mr. McFuzze to show why a fuzze watch should give better results in the long run, as long as he cannot prove them superior in any way. In Mr. Frit's communication, which I consider fairly and impartially written. He says it is more difficult to isochronize the spring, in case of a going-barrel watch, than it is to isochronize it. But in both cases the same manipulations are required, and with or without fuzze the hair-spring must of all necessity give an equal result, when the balance involves one turn, or one-and-a-half turn, the only difference is in case of a fuzze, the hair-spring's isochronal properties are not supposed to be affected. To give me great trouble an essential quality to a spring, and then not use it, strikes me as rather singular. It is useless to state that a hair-spring cannot cover the range of vibrations made by any well made watch with a four turn barrel, for it is done every day. If my memory serves me right, the ship chronometer, because of its large balance, the premium for close rates at the Paris Exhibition of 1855.

And now for Mr. Muna, who has evidently forgotten in his last communication that the balance is not a perfect isochronism, but is an objectionable feature, and yet attempts a dark thrust at Geneva, and a wicked one at the Neuchâtel State Observatory, because of its isochronism, not makers in England and America suppose the spring to be isochronous when the balance makes isochronous vibrations. I claim that no man can be called prominent who does not know the value of the case. The spring must be made over isochronous in order to overcome the resistance of the escapement, but the spring is not perfect for all that. Mr. Muna's misunderstanding. But I must give the learned writer the benefit of a typographical error, when he states that "the error is not in the mechanism, but in the balance springs loose in the small vibrations." He surely cannot mean anything so opposed to known facts. Again, he falls in error, in claiming that the balance is not isochronous, that it cannot be demonstrated that the spring is not isochronous when the balance gives isochronal vibrations. Suppose a watch is made with a balance of 100 banking pins, so that there is but little play after the escape wheel tooth has left the pallet stone, and watch being found to be perfectly isochronous in the large vibrations, suppose then that nothing else being disturbed in the watch, the banking pins are opened a good deal, causing a heavy friction in the unlocking action of the escapement, the watch will be found to be isochronous in the small vibrations. The reason has been given by Mr. Morris Immsch in his valuable essay—*Any friction, detrimental to the free motion of a moving body, is inversely proportional to the squares of the time employed to overcome it*. Now, if a large friction demands more isochronism, it is evident that the conclusion is that less friction will require less but some over-isochronism, or, in any watch the amount of over-isochronism of the spring is equal to the square of the friction of the escapement and atmospheric resistance, the balance making isochronous vibrations.

The objection that an escapement will last twice as long with than without fuzze, although Mr. Muna appears in the new role of America's champion, and pre- sents the case of the Fuzze party in France to make watchmen in England and America (unopposed by a clear demonstration) will amount to little in his ungrateful eyes.

However, as he claims to write for the future, I may as well give him some suggestions, appeal to posterity for a final judgment.

In regard to examining the rate of the watch, only the rate of the train, which Mr. Muna explains his objections to this plan. The Neuchâtel Observatory rates timekeepers both in horizontal and vertical positions. A word to the wise, etc.

The objection to moving the hands in pendant winders does not strike me as very ingenious, but if the hands of a watch, the hands will move backward

(Continued on page 185.)

THE
AMERICAN WATCH COMPANY
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NEW MOVEMENT!

Named A. W. Co.

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Will fit all American Cases.

The Escapement is jeweled throughout, also jeweled pallets, hardened and tempered hairspring and nickel balance.

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without stopping the watch, and the objection in moving them forward is equally one in fuzee watches.

If the fuzee parties were not more weighty reasons to put forward in favor of their claims, they had better, as Mr. Fritz has it, "own up the corn," and the success of our factories with fuzeeless watches would be to be an ample compensation for the laugh in the sleeve of our neighbors across the water, supposing Mr. Muma's imagination did not get the best of his judgment.

ELEMENT SANDOZ.

TRIBEUNE BUILDING, CHICAGO.

Mr. Sandoz's paper was loudly applauded by the Anti-Fuzeeite party, and even a few of the more moderate of the Fuzeeites, joined in the applause.

A second communication from Johnny Bull was then submitted:

FUZZEE VS. GOING-FIZZLEUM.

JOHNNY BULL CLEARS THE FIELD.

Genitals of the Horological Club:

I find that I am honored with the name "Johnny Bull" in your last discussion, although the name I signed was "J. B." But I accept the compliment, and hope I may prove myself to be a true thoroughbred Englishman and worthy to be called a Johnny Bull.

Mr. "Waltham" undertakes to ridicule my letter. Being unable to refute my arguments he tries to turn it off by low personal abuse. I shall not stoop to follow his example, for as an Englishman I believe in conducting an argument with dignity and decorum. Judging from his name, he represents a certain company that makes the going-rinnetum watches. I'll wager ten to one that he does, too. It is easy to see why he sticks up for the going-fizzleum watches so savagely. But he could not answer Mr. McFuzee's arguments in favor of the fuzee watch. No, he only says Johnny Bull must give us some facts. All right, Mr. Waltham. I will give you a million of them. I refer you to every chronometer and watch that was ever known to keep perfect time. Always and everywhere that have had the fuzee and chain. There are your proofs, without number and without end.

And now I challenge you to give me record of any going-fizzleum watch, made by your company or any other, in this country or any other country, that has ever kept perfect time, taking one day with another, for a year. Yes, sir, you may search the annals of horology from the creation of the world down to this day, and I defy you to produce a single going-fizzleum watch that has ever done it. It never has been done, because it can't be done. It is impossible, in the very nature of things. The least knowledge of mechanical principles ought to convince any one of the impossibility. It is amazing that persons calling themselves watchmakers should be unable to see a fact that is well known to every apprentice in England. A fact that has been for generations past acknowledged by all English workmen. Yet over in this country, watchmakers have not found out yet that the fuzee is indispensable for fine time-keeping. I tried last month to give the American workmen some good advice, but it was not with ridicule. But that is always the way. Those that know the least, are always least willing to take advice. But the man that really knows his biz is always willing to hear what others have to say. And if American watchmakers refuse to listen to good advice and prefer to grovel in ignorance, all right. I have done my duty towards trying to enlighten them, and shall do no more.

Mr. Muma takes up the cudgels for the fuzee and exposes the worthlessness of the going-fizzleum watches in a style worthy of a true thoroughbred Briton. And Mr. McFuzee lays about him in defense of the orthodox doctrines like a true Britisher. It is some satisfaction to know that all the best informed watchmakers are foreigners of some kind, even if they are not Englishmen.

And now, gentlemen of the Club, as I have demolished "Waltham," and showed that fuzee watches are the only ones who ever have or that can keep perfect time, I must repeat the how I expressed in my

last letter that you will not tolerate any more such unprincipled trifling with the established maxims and fundamental truths of our trade. Trusting that you will solemnly consider the vast responsibility of your position, I remain, gentlemen, with profound respect and esteem, Yours for the right, J. B.

During the reading of this communication, Mr. Waltham's usually serene countenance was observed to become gradually clouded, and at the end of the reading the approaching storm which these signs indicated broke out as follows: You are a darned old fool Johnny Bull, and if you think that you are clearing the field you only make yourself ridiculous. Why, the argument is as clear as ice against you, and sharp to the point like "No" from your sweetheart, Johnny. When you think of the hundreds of millions of going-barrel watches which measure time's theoretical transmigration; the millions of assorted proof which you blow so hard about in connection with fuzee watches is whittled down to indistinctibility, and you must know yourself that there are no millions in it. Your mind is unbalanced, Johnny. The spiral column of your astronomical construction is turned into a railroad for the rapid transit of the grim and gory goblins of despair, when you reflect that the manufacturers of Geneva, London, Coventry, and Liverpool are rapidly abandoning the fuzee and chain. The scaly alligators of remorse are galloping through the internal principles of your animal verities when you think of your staidity and prolonged obituary in this matter, Johnny Bull.

You abuse us by the manmitted ghost of a time honored scantily to let the fuzee alone, I abuse you, Johnny Bull, by the great horn spoon, and by the nutritious health giving qualities of your native roast beef and plum pudding, to solemnly and prayerfully reflect on the character of your ways. Take back that statement that the best watchmakers in the country are foreigners. Mr. McFuzee's father may have been one, but by the great jumping Jerusalem bomb with friend Muma feel when he is designated a foreigner. Take back those obnoxious words I say, or by the American eagle that whipped the cursed goosecock of creation there will be lively times if we are able to establish your identity, Johnny Bull.

The following well written paper was then read:

GOING-BARREL VS. FUZZEE.

To the Members of the Horological Club:

The very interesting communications from various correspondents, published in your last numbers, cannot fail to attract much attention on the part of the Watch Trade and the Public as well, and also give rise to many comments from practical artists in Horology. The subject is one full of interest to all, particularly in this country where almost everything is depended upon "Time." In this Fast age of this, the Fastest country of the world, minutes are now and must henceforth always be supplanted by seconds and even fractions of seconds, and therefore the question in point is how to best secure accurate timepieces. Another consideration presents itself at this time. The watch being so general, it is absolutely necessary to secure at once a perfect timer and one within the reach of the average purse. The simpler construction of the going-barrel watches effectively disposes of this latter requisite, while the careful study of the relative proportions of the different component parts of the fuzee watch has already established the possibility of correct timekeeping without the cumbersome adjunct of the chain and fuzee. Actual observation fully demonstrates the truth of the foregoing assertion and a casual visit through the leading Watch and Jewelry stores in the United States will fully corroborate it. Among the finest watches sold, there are not over three per cent. having the fuzee and chain, and the preference for the going-barrel kind is certainly not traceable to its inferior cost, for the difference in price between the two varieties is only trifling, and their purchasers, as a rule, are not persons who contemplate economy so much as the securing of a flawless watch. It is painfully

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ONYX Goods a Specialty.

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New York.

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CHAS. D. ROOD,
JESSE F. SMITH.

Factory, Jersey City.

Specialties, Chain & Band Bracelets & Opera Chains

evident that the sale of this grade of goods is most difficult, by reason of the interminable amount of "shopping" practiced by any one desirous of purchasing a fine time-keeper, hence the selection necessarily must be a correct criterion of judgment, preference on the part of the public in general.

It is not to be supposed that watch manufacturers, here and Switzerland, would continue to produce going-barrel watches to the almost entire exclusion of "fuzes," and thereby injure both their reputation and the means of livelihood, if the latter construction offered the superiority claimed by its blind advocates. In theory, perhaps the fuzee may be more correct, but to perform accurately must be most carefully constructed, and this unfortunately is but seldom the case. The excessive friction of this arrangement requires the most careful distribution of the parts and an untold amount of extra fine adjustment by reason of the loss of force. In the common English lever, for example, the mainspring is always several numbers stronger than in the Swiss or American Anchor of same size, and generally much shorter. The English lever is now entirely discarded and the watches which have supplied give very much better satisfaction to their wearers. In the finer English grades, notably among the "keyless," the fuzee is frequently dispensed with, and for all that the time-keeping instead of being impaired is improved.

The statement made by Mr. S. F. Gordon in your July number, about the English Marine Chronometer being the most perfect timepiece yet produced, is not exempt from criticism and in reply I would mention a little experience I had some two years ago. While on my way to Europe on board of one of the German Steamers, having become very intimate with one captain, I noticed one afternoon in May, 1875, when very near the Scilly Islands, so painfully notorious since the loss of the Schiller, that both the captain and the first officer were deeply perplexed. Upon inquiry I ascertained that by their reckoning we must have passed the Islands and yet the latitude was too high to allow of such an unprecedented feat, to accomplish which it would have been necessary to have traversed the land as well as the briny deep. The officers concluded that the ship's chronometer must have varied more than they had calculated upon, in fact more than it did when rated on land, so the captain being aware that I was a very accurate "Masse" watch, No. 1, asked to compare notes and made a new reckoning. He thereupon stated, "If your watch is right we shall see the Islands about 5, P. M." At just four minutes of 5, the lookout signalled "Land," and you may well imagine that captain's joy. The watch had been in actual use at least three years and at all times maintained a uniform rate, while the chronometer like so many others, so "well positioned" in its horizontal position was affected probably by change of temperature, and therefore not reliable.

I would further add that it has been my good fortune to observe the performance of many watches, being rated both fuzee and going-barrel, of various nationalities and makes, and I have been forced to admit that the latter variety, as a rule, come down to "time" a great deal more kindly than the former, as soon as the isochronism of the hair-spring is established. In numerous instances I have seen even very ordinary Swiss Anchors, if well sprung in the barrel, run absolutely true, that is exactly the same as a well regulated ship's chronometer, at all hours of the day and evening, while the English fuzee watches could not be brought anywhere near a decent rate, and the watchmaker who had in charge fully understood the different movements, being an artist in his profession, and thoroughly competent to supply any missing part or to remedy any defect of construction in any of the watches he had in charge.

I will not take up any more of your valuable time, but am ready to convince any "Thomas" that may present themselves, and respectfully subscribe myself

Ever yours, BARRILL.

Mr. Clerkewell rose and said the pretty little story which they had just listened to, concerning the German steamer, the Scilly Islands, and the erratic ship's chronometer, was very entertaining, but he thought that he could bear it no longer. A personal friend of his own happened at one time to be on a voyage from South America, when an accident occurred to the ship's chronometer which disabled it for the purposes of navigation. There did not happen to be any Swiss watch on board, but a two-and-a-half dollar Yankee clock hung in the cabin, and by its sale the captain was enabled to navigate the ship safely to New York. On remonstrating with his friend that such a thing was impossible, no amount of reasoning could convince him to the contrary. For he was there himself and saw it.

The following communication was next submitted:

FUZZE VERSUS GOING-BARREL.

To the members of the Horological Club:

GENTS:—I see that much of your time is consumed in the discussion of the relative merits of the fuzee and going-barrel, and that several correspondents have gone into it with a vim. Early education, or impressions will have their effects on the best or worst of us, and many times cause us to adhere to that, which our own judgment tells us is wrong, and again, it so blinds us, that we can never be convinced by any argument that we are not in the right. The advocates of the fuzee can bring the best of reasons to support their claims, and if we leave out the actual tests of the two systems, I think they have the best of the argument. But what workman is there, who has not seen just as good results from the going-barrel as from the fuzee? Of course I mean those who have had the handling of fine watches of both kinds. It strikes me that the *only way* to test the relative merits of the two systems, is to construct a watch so that it can have a going-barrel or fuzee, when you can be certain that all other conditions are equal. Let the watch be thoroughly tested by the fuzee for instance, and then with the going-barrel. If you had two such watches so much the better, then try each for a week or month, at a distance, which it would have been necessary to have traversed the land as well as the briny deep. The officers concluded that the ship's chronometer must have varied more than they had calculated upon, in fact more than it did when rated on land, so the captain being aware that I was a very accurate "Masse" watch, No. 1, asked to compare notes and made a new reckoning. He thereupon stated, "If your watch is right we shall see the Islands about 5, P. M." At just four minutes of 5, the lookout signalled "Land," and you may well imagine that captain's joy. The watch had been in actual use at least three years and at all times maintained a uniform rate, while the chronometer like so many others, so "well positioned" in its horizontal position was affected probably by change of temperature, and therefore not reliable.

I would further add that it has been my good fortune to observe the performance of many watches, being rated both fuzee and going-barrel, of various nationalities and makes, and I have been forced to admit that the latter variety, as a rule, come down to "time" a great deal more kindly than the former, as soon as the isochronism of the hair-spring is established. In numerous instances I have seen even very ordinary Swiss Anchors, if well sprung in the barrel, run absolutely true, that is exactly the same as a well regulated ship's chronometer, at all hours of the day and evening, while the English fuzee watches could not be brought anywhere near a decent rate, and the watchmaker who had in charge fully understood the different movements, being an artist in his profession, and thoroughly competent to supply any missing part or to remedy any defect of construction in any of the watches he had in charge.

Mr. McFuzee considered that this paper was suggestive of the practical common sense and love of fair play which was a characteristic in their much respected correspondent. For himself, he was perfectly willing, in fact he was anxious that the question in dispute should be submitted to a practical test. He had a most decided opinion, however, that one month's trial was too short to conclusively test the comparative merits of the two systems of applying the mainspring.

This ended the fuzee and going-barrel question for the evening. It must be distinctly understood, however, that only

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the more important points in these discussions are published. The proceedings of this Club has of late extended far beyond the original limit, and although the proprietor of this paper has at all times cheerfully acquiesced in any demand for increased space, there is a limit which in common decency cannot be over-passed.

AN IMPROVED HAIR-SPRING STUD.

The following paper on this subject was then read:

To the Members of the Horological Club:

In the July number of the JEWELER'S CIRCULAR, "Excelsior," in his directions for applying hair-springs to watches, remarks as follows:—"But as springs occasionally need to be shifted even after they are fitted, it might be a good idea in fine watches to pin them with a flattened pin on each side, unless some inventor can furnish us a stud with a slot instead of a round hole for the hair-spring." In view of these remarks, I have made a stud which I think will meet the requirements of "Excelsior," a rough specimen of which I send for your examination.

My stud has another improvement at the base, as you will observe, it has a slot cut in lengthwise, and is held fast by the plate by two screws, a movable in and out, and is therefore adjustable to different diameters of springs and the curb pins. It is in it an improvement on the cock and bar shaped studs made at the present day.

The manner of making a slot for a hair-spring stud is, I think, presumptuous on my part to explain, for the idea will suggest itself to every practical watchmaker, but for the benefit of some that "cannot think" I will explain the *modus operandi* of it, as follows:

Drill a hole in the proper place in the stud, a little larger than the usual size round holes in studs, make a small wedge shaped punch, with sharp and square corners, gradually tapered, temper to the hardness of a watch mainspring, insert the wedge in the stud hole and drive it in so it will project a fraction beyond the hole, then rest the under lip of the stud on a riveting stake or small anvil, and give two or three smart taps with a riveting hammer on the upper lip of the stud, this will shape the hole to the shape of the wedge, and will at the same time loosen it so that a slight tap with the hammer on the small stud will drive it out, when you insert the punch in the small end of the hole and repeat the operation. Should the slot then not be sufficiently large, or of a good shape, sharpen up the wedge and restore it to the proper shape if injured, soften the end of the stud and go through the same operation and you will certainly succeed. The whole job can be done in fifteen minutes by a careful workman.

Hoping you will excuse this intrusion on your valuable time with so trifling a subject, and with my highest regards,

I remain yours, very respectfully,

S. F. GORDON.

SHREVEPORT, La., August 3d, 1873.

The model illustrating Mr. Gordon's stud was then passed round and critically examined. The formation of the hole for fastening the spring was much admired, but the great wonder was, why some members of their Honorable Body did not anticipate Mr. Gordon in such a simple and practical improvement.

TRADE SOCIETIES.

The following communication on this question was then read:

To the Members of the Horological Club:

I see in the last issue of the JEWELER'S CIRCULAR, an article headed Trade Societies by Mr. J. D. Stocking. I heartily endorse his plan. Let every watchmaker throughout the different States form societies of that kind, to be held in the capital of their different States, say every six months, and establish certain rules and by-laws, and bind each member to adhere to them. In my opinion it is the best plan as it will work in harmony with ourselves and customers. Let us go to work at once to form societies. Being an Initiate, I would like to hear from our watchmakers in Indianapolis, and hope some energetic workman will use his influence towards organizing a society of that kind there, and let us country watchmakers join

hands. I hope to see the day when societies of that kind will be formed in every State in the Union. I would like to hear from some more able writer than myself.

E. W. COLLS, Pendleton, Ind.

Several members of their Honorable Body expressed their views on Mr. Colls' letter. The general feeling was in favor of trade societies wherever there was sufficient material to construct them from and where the necessary wisdom existed to organize such societies, so that they would be beneficial to the trade and to the public.

REMOVING MAGNETISM FROM STEEL.

Another letter on this subject was then presented for consideration:

To the Members of the Horological Club.

With an apology for keeping this subject before your honorable body at another meeting, and the promise that I will close with this communication, unless requested to explain something practical in the method of operating. I will say here that Mr. Horologer's position and argument was anticipated. His one idea of polarity, viewed from his stand point of reasoning, we think, does not quite cover the whole magnetism, and can agree with him in his idea of reversing a common law of all forces in this instance. I acknowledge my incapacity to comprehend how loads of steel swallow electromagnetism, or how small quantities of electro-magnetism swallow up the greater. The quantity of force in a magnet is obtained by artificial means from the greater force in nature, and the *fact* that any magnet, especially with the poles left open, does gradually lose its quantity of force, conclusively proves that its current of motion or force of attraction is just as gradually drawn back again into nature's elements. That magnetism is motion can be as clearly proved by holding a needle suspended by a thread between the poles of a magnet, or by iron filings thrown into the current, as that *steel* has motion by throwing a handful of chaff into its current. And motion is the predominating principle of the universe, and every molecule of which we have any certain knowledge must be under its influence, and that the artificial motion of a watch is no exception.

As to electricity, and that electricity is the source of magnetism; these facts considered, we are at least half inclined to believe our theory tenable. And whether our process may be termed demagnetization or anti-polarization, is of little consequence to the trade practically, since the practice is a success. Mr. Horologer may differ with me in theory, though it might be otherwise in practice, were he thoroughly acquainted with our manipulations, this being possible, I will not condemn his process, but withhold my declaration of fallacy till some scientific Ecumenical Council shall have conferred upon me the degree of initiation. There are yet some practical facts connected with this subject of which I have not written, *viz.*: If the steel to be demagnetized contains more intensely crystallized molecules of carbon, or steel, or gentleness, and whether if the steel is very much harder than that of the magnet, and the pieces small, slender and conical, or sharp pointed, the process requires more time in operating, and much longer time, only keep trying very slowly till the result is satisfactory. There are sometimes symptoms of capillary resistance at the small conical points, but if they are in the caliper, or movement plates of a watch—the plates act as a conductor. With the belief that you will find this subject a fair test by actual experiment, and render just judgment. With thanks for criticism,

I remain respectfully yours,

A. B. F.

MILWAUKEE, Ohio.

The Chairman assured A. B. F. that no apology was necessary for again writing on this subject. Mr. Horologer had something to say on this question, but he regretted his absence these last two meetings. It was pretty certain that he would be in town again by October, when in all probability there might be something further said on the question.

At this stage their Honorable Body adjourned.



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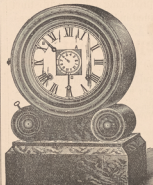
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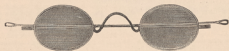
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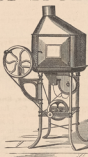
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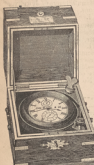
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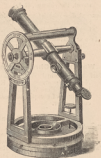
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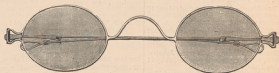
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Translated for the Jeweler Circular and Horological Review by Joseph T. Rogers.

PROPERTIES OF COMPENSATION BALANCES.

(After M. Martens.)
As we have previously remarked, the proportions determined by this skillful watchmaker (Mr. Martens) appear to us especially connected with the manufacture of the Canton of Neuchâtel, which in the course of several years have made watches of different calibres. Therefore we see that the progression of the motive force, in relation to the diameter of the balance, is not irregular from one table to another.

The measure for the diameter of the balance has been taken from the cover of the barrel and the height of the balance is about $\frac{1}{4}$ of the breadth of the main-spring. With these points of M. Martens we could re-establish the calibres of those watches which used it service as standards.

We have to deal here with the total diameter of the balance the projection of the screw included. The true theoretical diameter cannot be determined when the distribution of the mass is not indicated.

We insert these tables, but only as practical data, good to afford a first approximation. (The measure unity is the millimeter and the gramme.)

Anchor and Duplex Watches.	Pocket Chronometers.	Strong Pocket Chronometers.
Weight Dns.	Weight Dns.	Weight Dns.
0.050mm. ... 20 ... 20	0.050mm. ... 20 ... 20	0.050mm. ... 20 ... 20
10 ... 20 ... 20	10 ... 20 ... 20	10 ... 20 ... 20
15 ... 20 ... 20	15 ... 20 ... 20	15 ... 20 ... 20
20 ... 20 ... 20	20 ... 20 ... 20	20 ... 20 ... 20
25 ... 20 ... 20	25 ... 20 ... 20	25 ... 20 ... 20
30 ... 20 ... 20	30 ... 20 ... 20	30 ... 20 ... 20
35 ... 20 ... 20	35 ... 20 ... 20	35 ... 20 ... 20
40 ... 20 ... 20	40 ... 20 ... 20	40 ... 20 ... 20
45 ... 20 ... 20	45 ... 20 ... 20	45 ... 20 ... 20
50 ... 20 ... 20	50 ... 20 ... 20	50 ... 20 ... 20
55 ... 20 ... 20	55 ... 20 ... 20	55 ... 20 ... 20
60 ... 20 ... 20	60 ... 20 ... 20	60 ... 20 ... 20
65 ... 20 ... 20	65 ... 20 ... 20	65 ... 20 ... 20
70 ... 20 ... 20	70 ... 20 ... 20	70 ... 20 ... 20
75 ... 20 ... 20	75 ... 20 ... 20	75 ... 20 ... 20
80 ... 20 ... 20	80 ... 20 ... 20	80 ... 20 ... 20
85 ... 20 ... 20	85 ... 20 ... 20	85 ... 20 ... 20
90 ... 20 ... 20	90 ... 20 ... 20	90 ... 20 ... 20
95 ... 20 ... 20	95 ... 20 ... 20	95 ... 20 ... 20
100 ... 20 ... 20	100 ... 20 ... 20	100 ... 20 ... 20

FINAL ITEMS.

To substitute the weight for the speed, which is the regulating element. The Equilibrium of the balance.

It has been said that one can substitute weight for speed and reciprocally. This is not so to a certain extent, but only for an increasing or lessening of the amount of vibrations. For instance, if we double the thickness of the rim of the balance, the true or theoretical radius and the circumference will be increased also; in this way the weight and the speed will be increased at the same time; but if we had lessened the thickness of the rim the result would be contrary.

In clocks the main element for regulating may reside in the weight of the pendulum ball.

In watches the main element is the speed. 1st. On account of the laws of inertia; a heavy body which moves slowly may be easily affected by the resistances it meets, shaking of its support, &c., &c. 2nd. The friction of the pivots is proportional to the diameter after Berthoud and Rouilly (we do not know any more precise experiments than those made by them) and this friction after Berthoud increases like the speed multiplied by the mass.

The heavier the balance is the more difficult it will be to produce the same speed in the vertical and horizontal positions. For instance, the Rouilly's day watch having a balance of the diameter of 20 millimeters, making 5000 oscillations per second, and weighing about 1 gramme, was very well regulated according to the Academy's report, when it was kept in the same position; but when it was changed from the vertical to the horizontal position, and therefore we can undoubtedly assert that one of the elements determining the weight of a balance resides in the time the watch keeps in both positions.

The recent bio-metallic balance has a decided tendency to become oval through the changes of the weather. It would be better to substitute these bio-metallic balances employed by many manufacturers with a balance made from only one metal and having screws projecting from the edge.

The equilibrium of the balance may be altered between two different extensions of the oscillation; this would be the result of the holes or pivots not being round enough, or by the moving of the centre of gravity of the hair-spring. This inconven-

ience is to be apprehended above all in the pocket chronometers.

These changes, accidental or permanent, in the equilibrium of the balance are the causes why the effect of the two masses are not alike. One will be more efficient than the other, and according to the different vertical positions of the chronometer there will be an extra weight up or down. Thus some perturbation may happen to the bio-metallic balance.

THE COMPENSATION BALANCE UNDER THE ACTION OF CENTRIFUGAL FORCE.

The centrifugal effort tending to remove a mass in motion from its turning centre increases as the square of the distance of this mass to the centre of the axis. If the distance remains the same whilst the speed changes the effort increases as the square of the speed.

In a chronometer's balance the centrifugal effort is greater the heavier the masses are and are extent of the oscillations.

If the bio-metallic rim does not offer enough resistance it may give rise to two inconveniences. 1st. The masses moving further and further distant will change the momentum of inertia of the balance. 2nd. The plates shall have continuous vibratory movements, to take place only in the large oscillations, for in the short ones the plates will be firm enough.

We resistance force which we have noticed these two causes of irregularity.

THE COMPENSATION BALANCE UNDER THE INFLUENCE OF RETARDATION, CHANGES IN TEMPERATURE AT EXTREMES.

It is generally established (the differences are without any means of estimation) that the expansion of metals is in proportion to the change in the temperature, say between 0 and 100 degrees.

In experiments made on chronometers, Dent, a skillful English watchmaker, has found that the tension force of a balance spring always changed with the temperature.

The experiments of M. Rodanet de Rocheport, reported in the *Revue du Chronométrique* come to the same result that the changes in the force of any balance spring follow the thermometric movements, and demonstrates that the outward and inward motion of the effective weight of a compensation balance is effected by following the thermometric circumference, and by decreasing quantities proportional to the distance to the centre as the temperature rises, and increasing as the temperature falls.

To equalize the quantities removed to or from the centre, it would be necessary that the recent giving the direction of the mass should not be confounded with the modern balances.

Even after realizing this condition we could only have a rectilinear compensation, going precisely with the temperature. Should the balance be any better? Let us study this point.

Long time the chronometer manufacturers have noticed that a regulated chronometer in a medium temperature, for instance, 15° retained in the two extremes of 5° and 30°, but it is our opinion that the elder Dent was the first to publish this fact and explain it as follows:

The dimension of force in the temperature spring proceeds uniformly in proportion to the increase of temperature, and may be therefore represented by a straight line inclined by some angle to another straight line, which is divided into degrees of temperature. But the inertia of the ordinary compensation balance cannot be made to decrease quite as fast as the temperature decreases, and therefore its rate of variation can only be represented by a curve, and can therefore only coincide with the straight line representing the variation of the force of the spring in two points, either the two extremes or the two means or one extreme and one mean.

Now, to make ourselves understood by those who are unacquainted with mathematical language, let us suppose a true or theoretical radius of 10 millimeters increasing 1 millimeter for a degree in the decrease of temperature, and the force of the balance-spring increasing for every x degrees as the eiphers: 1. 10. 15. &c., &c., that is from one point to another of a

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value always uniform; the momentum of inertia represented by the ciphers: 105, 115, 125, 135, &c., &c., or 100, 121, 144, 169, &c., &c., increases from one point to another of the ciphers: 21, 23, 25, 27, &c., &c., that is of a greater and greater value.

Therefore the momentum of inertia increases more rapidly than the force of the balance spring, and the consequence is a retardation in the time of the chronometer.

We could in the same way demonstrate that a chronometer, regulated to a certain temperature, will lose by a using of same, and regulated to two extreme temperatures, will gain in the medium temperature. The actual compensation balance, even furnished with a retentive compensation, would be then defective because in either case the changes of its momentum of inertia would not follow on the same progression as the elastic force of the balance spring, and of the other advancing or retarding influences resulting from the wheels or the escapement.

Practical Hints on Watch Repairing.

BY EXCELSIOR.—No. 7.

(REMARK.—In section (97), a line is left out of the description of the horizontal plate. Instead of "step 1½ inch wide," it should have been "1½ of 2 inch long, ¼ inch wide," &c. The succeeding paragraph, "a piece of an old pair of trousers will do," should show the mistake, but it is left to be corrected. In section (98), instead of "without any cut," read "without any open spring." In section (79), the reference given should be 60, instead of 50. If the reader discovers any such typographical or otherwise errors will be kindly send notices thereof to "Excelsior," care of the JEWELLER'S CHURCHILL.]

(100) Premising that all previous requirements have been properly attended to, we are ready to test our hairspring to see whether it is isochronal, and if not, in which direction it errs and how much. This is done by causing the arcs of vibration to vary considerably, in the manner that is most convenient, and accurately observing the rate of the watch for an equal period with the long and with the short vibrations. In Marine Chronometers it is done by keying up or letting down the main-spring by the ratchet—making the motive force stronger or weaker and thereby changing the arcs. The same thing can be done with force watches, but not to so great an extent, as their main-springs are generally so short that there is little extra length for keying up or letting down.

(101) In such cases we may change the arcs as follows: Wind the chain entirely up on the fuse, hook it to the barrel and key up the spring one turn. This gives the weakest force of the mainspring, with the least upon the smallest part of the fuse where the power of the spring is transmitted to the train at the greatest disadvantage, so that the vibrations will be very small. We then take time for four hours; or, if that is not enough, wind it up and repeat till the desired length of time for the trial is passed. Next try it with the chain wound only one turn up on the fuse, while the main-spring is keyed entirely up. This gives the other extreme, or the greatest strength of the spring acting on the fuse at the greatest advantage, and giving the largest vibrations the movement is capable of. Take the time as before, either for four hours, or any desired period, winding it up at intervals as needed to prevent running down. All this is easily done if the barrel arbor has a good square on its projecting end.

(102) The above is an extremely severe test, and hairspring that will bear it may be considered practically perfect. The more common method is to wind the chain entirely up on the fuse, then hook it to the barrel, and key up the spring enough to run the watch six hours; then, without disturbing the fuse, key up the spring enough for another six hours, and still the chain has all left on the fuse, when the main-spring will generally be properly keyed up for the ordinary running of the watch. The time must be

carefully taken for each period of six hours, and if the different times are alike the spring is isochronal. In watches with going-barrels, the time may be taken first with the spring wound entirely up, re-winding at regular intervals to keep up the motive power, then with the main-spring wound up only one turn, re-winding as before to prevent running down.

(103) Perhaps as good a way as any, because so completely under the workman's control, is to set a bristle in the Upright Holder so as to rest against the balance staff, (60, 75), and diminish the vibrations in that way, if the construction of the movement will allow it. This method can also be followed after the balance bridge is in its place and the Holder depressed, by fastening the bristle in a tiny clamp which can be attached by a set screw to one of the plates of the movement, or even to one of the pillars or bridges—turning it to give the bristle the desired pressure against the balance staff, but which should never be so great as to interfere with the free movement of the balance.

(104) When no other convenient way is available, the watch may be tried first in the horizontal then in the vertical position, and the motion of the balance will generally vary enough for our purpose to find the different positions, unless it has been adjusted to positions. When the arcs are changed in this way, the same vertical position should be kept in each trial, unless there is a difference of rate in the four vertical positions, arising from defective pivot fittings, want of poise in the balance, &c. If so, it will be necessary to find the time of the trial between two opposite vertical positions and take the mean of the two, in order to neutralize the irregularity. For instance, if in the horizontal position is for 12 hours, then the watch should be tried 6 hours with XII up, and 6 with VI up, by which means the accelerating or retarding influences in the two positions would neutralize each other, and the result of this 12 hours could safely be compared with the other. A still better way is to run it 8 hours in each of the four vertical positions. But this method is at best a makeshift, and should never be followed if the variations between the several vertical positions arise from poor construction of the escapement, nor if all the variations are very slight. The proper course is to remove their cause before isochronizing.

(105) To detect the cause of the variations between the different vertical positions, we have the following indications, supposing the balance to be properly poised. As a general rule any increase of friction in the escapement tends to retard the short arcs more than the long ones. If the trouble is in the escapement it will be shown by moving the roller or rollers of the lever or chronometer around on the balance staff, putting in beat and trying, when the errors will take place in the same position, whether the balance is up or down as before, then, if the balance is in poise, the pivots are not round, and its revolution causes them to alternately raise the balance and let it down, according as the position of the pivots is up or down, or horizontally across the jewel hole. If the pivots are so placed that in moving from the point of rest to either side, it raises the balance, it will set it in poise. If it lowers the balance, it will set it in poise. But if such motion results in lowering the balance, it will appear to be bottom-heavy. A three-lobed or other irregularly shaped pivot will have the same effect. For these defects changing the poise will be of no avail. There is no remedy but a new staff with properly formed pivots, or making the pivots round and fitting the jewels to them. It should be noted that if the pivots are bent, or not made in the centre of the staff, or if the balance is not riveted concentrically to the staff, the results will be the same as above stated, although in these cases it may often be possible to correct the error by poising. If the pivots are correctly made, it should be understood that the deductions above given are to be taken only after the more ordinary corrections of mechanical errors, already described,

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have been made, and fail to account for the variations noted.

(106) But in whatever way the extents of the arcs of vibration may be changed, if we find that the watch keeps the same time while running at 4, 6 or 12 hours with the long vibrations, as during the same period with the short ones, the spring is already isochronal. But generally the watch will run slower with the long vibrations than with the short ones. In some cases the difference may be only a second or two—barely perceptible; in others, it may be several minutes. If the variation is considerable, it is better to repeat the tests before making any change in the hair-spring, to ascertain whether it is not due to some irregularity in the movement. For it is useless to attempt to isochronize the spring unless the movement is in good condition.

(107) Now it is possible to do it without a regulator whose rate can be depended upon as absolutely correct. Those with well made mercurial pendulums are best. But in the absence of this a good chronometer may be used, but is not so convenient as a regulator with either a center seconds or a separate seconds-dial, and a visible pendulum, being seconds. During these trials the watch should not be subjected to any great change of temperature, as the effect of heat and cold would be confounded with the normal action of the spring and mislead the workman. The compensation for heat and cold is no part of the duty of the hair-spring, but, on the contrary, the adjustment of that compensation must cover the effects of heat and cold upon the spring. It must therefore be kept at a uniform temperature while being isochronized.

(108) Just here I would notice a "quick and easy method of testing the isochronism of a spring," widely taught and highly endorsed—Insert four pins in the rim of a balance, about a quarter of an inch long and equidistant from each other. Then fix a temporary detent by the side of one of the pins when the spring is free. Then let the balance quarter, and the detent, and let the next pin rest against the detent, and find the weight that will just balance the force of the spring when placed on the pin. Then turn the balance another quarter around, and if the weight that pin will sustain is just double the former, the spring is isochronal. Turn the balance to the third pin, and the weight should be three times the first. If the spring will not sustain that weight, it will be too fast in the long vibrations, and so on.

(109) Notwithstanding the eminent endorsement of the above "test," it is simply another piece of eminent ignorance and nonsense, only approximately true in theory, and worthless in practice. There is no practical method of testing the isochronism of a spring except by testing it in the watch, in the precise circumstances for which it is required to be isochronal, by timing it as already described. Were the strength of the spring the only factor to be considered, this test would be theoretically correct for perfect spring. But since all escapements do in some degree disturb the oscillations of the balance, and different escapements do this very differently, it must be impossible to isochronize a spring independently of the escapement, i. e., otherwise than in the watch to which it belongs. And this conclusion is the more evident when we consider the many other disturbing influences, of which we cannot foresee the nature, degree or manner of their occurrence, but which must necessarily be provided for.

(110) Even were it possible to secure certain and definite conditions, and to know the exact form of the strength of coils adapted to them, the above test would be practically worthless from its clumsiness. A watch makes, we will say, 400,000 vibrations in 24 hours. Now does any one suppose that, by the above or any other weighing process, it would be possible to detect a variation from the proper progression in the strength of the spring of one grain, after multiplying the effect it produces on a single vibration 400,000 times, only causes an error of a few seconds more or less? The idea is absurd. It does seem as if there was more idiotic balderdash

written, talked and believed, about this subject of isochronism than any other. Perhaps it is because every man thinks no one knows any more about it than he does, and might possibly be air his pretended knowledge with perfect safety. The above "test" might however detect errors amounting to several minutes in a day, but such errors cannot occur if previous directions for setting springs have been followed, and any workman would know that such a spring was unsuitable or defective, without any test at all.

(111) We will suppose that in running our watch 12 hours with the long vibrations, its hands show 11 hours, 59 minutes, 45 seconds—and, for the 12 hours with the short vibrations, 12 hours, 15 seconds. Then there is a difference of 30 seconds—the long vibrations being slower than the short ones, or taking longer time to accomplish them. This point must be clearly understood, to prevent blunders and improper alterations. Whenever the watch goes, it is because more than the proper number of vibrations have taken place in the given time, therefore they are shorter than they should be. When the watch loses, less than the proper number are made, hence the vibrations are longer than it should. But it does not matter whether the times kept by the watch are faster or slower than the correct time, nor if our alterations make the watch faster or slower than they should be. All that is necessary for these tests is to compare the two times with each other, to see whether the vibrations are quicker or slower than the long ones.

(112) The question naturally arises why the long vibrations are slower or quicker than the short ones, when the length of the hair-spring is exactly the same in each case. The prevailing theory is that the isochronism of the spring depends on its being of a certain length in proportion to its strength, and if it is longer than that it will lose in the long vibrations, but if shorter, it will gain in the long vibrations. This theory is credited to Pierre le Roy, and has the endorsement of Jargensen, and a host of other eminent authorities. From LeRoy's day to this. Yet it is not true, for a spring will have several different isochronal points, while it is not isochronal at any other point. The fact, therefore, appears to be an isochronal point somewhere in every coil, provided that its length is not so great or small as to interfere with its free and proper action. This theory has the appearance of truth, because, when the isochronal point is formed for the particular spring, if it is lengthened it will lose, and if shortened it will gain, in the long arc. But that isochronal point depends upon many other conditions besides the proportionate length and strength of the spring. The number of coils and manner of coiling, the nature of attachment to the stud and collet, the shape of the terminal curves at the ends, are among the conditions in the spring itself which may either improve or destroy its isochronism. And outside of the spring are many others. The truth is that a spring which has been perfectly isochronized is so only for the precise conditions for which it is adjusted.

(113) An esteemed friend, after reading the preceding article, No. 6, sends me his definition of isochronism as follows: "Isochronism is a certain correspondence or relation between the proportions of a hair-spring and of a balance, and such that under proper conditions the spring will move the balance through greater or smaller arcs in equal times." This is very good so far as it goes, but, as already pointed out, it will depend slightly upon the original plan of these articles. I consider some of the principal elements.

(114) It would be interesting to go fully into the question of isochronism, the effects of

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all the modifying influences upon the extent and the time of the vibrations. But to do so would require several articles, and I will content myself with a brief classification of a few of the more prominent influences and their practical effects. And to make my idea of them perfectly clear to the reader, we will take a pyramidal figure to illustrate them. The base line of this pyramid represents the length or extent of the vibration, while the momentum of the balance is represented by its sides, which rise to a greater distance from the base as the momentum increases, and after passing the centre fall again as the momentum decreases, till it meets at the other end of the base line or end of the vibration. The apex of the pyramid, or highest point from the base, represents the greatest momentum, at the middle of the vibration; and the greater or less inclination of the sides corresponds to the progressive increase and decrease of the momentum.

(112) Now the effect of any friction or retarding influence which is equal and continuous throughout the whole of the vibration, as the friction of the pivots, thickening of the oil, pressure of the balance or cylinder escape wheel against the pallet axis (during the free arc of motion), etc., may be represented by taking a straight line from the bottom of the pyramid, i. e., a uniform loss through the whole vibration. This leaves the base narrower, (or the vibration shorter), but the angles of the sides (or the ratio of the momentum of the balance), unchanged.

(116) There is another class of influences, the principal and type of which is the resistance of the air to the motion of the balance. This depends on the construction, weight, specific gravity and exposed surface of its parts, and it increases with the increase of the arc of vibration in the proportion of the squares of the velocities. That is, if one balance vibrates twice as far as another, and in the same time, the resistance of the air to the motion of the former would be four times as great as of the latter. But as the momentum of the balance also increases as the squares of the arc, they therefore increase and decrease uniformly. Of course a smooth, heavy balance will meet with less resistance than a large and light one, with numerous screws, etc. But whether that resistance be great or small, whatever the amount may be it will increase and decrease as the squares of the velocities. Therefore, if the inclinations of the sides of our pyramid correctly represent the increase and decrease of the momentum of the balance, the resistance of the air may be represented by taking off a thin uniform slice up and down the other, leaving the shape precisely the same but making the base a little narrower, as before—that is, shortening the length of the vibration, and lessening the momentum, but without changing its ratio. The greater the resistance, the thicker this slice to be taken off.

(117) Thirdly, different escapements affect the time of the vibrations, because they interfere with the normal time which the spring alone would give, by breaking in at a certain point and giving the balance a push, thereby hurrying up its motion while in contact. So that the length of the time of contact, or angle of impulse, becomes a factor in the problem, as well as the frequency of these contacts—whether occurring at each vibration, or only alternate ones, as in the chronometer and duplex; and whether there is any recoil in the escapement, as in the duplex and cylinder escapement under certain circumstances. The power required to unlock the escapement, giving more or less of a check to the motion of the balance, is an important factor. In the case of the escape wheel teeth against a cylinder or balance staff, urged on by the entire motive force, must at the instant of impact exert a checking influence. In the cylinder escapement the side pressure upon the balance axis is removed during the arc of escape, at the middle of the vibration—another point to be considered.

But practically, these influences of the third class become small in a well made escapement, as, after the balance has acquired its full motion, the accelerating influence (or its excess over the checking influence) is only sufficient to keep up

the vibration of the balance and make up for power absorbed by the various resistances to its motion. That this maintaining power is its only effect upon the balance may be seen by suddenly disconnecting or cutting off the motive force of the movement, when the balance will at first vibrate precisely as before—and then gradually fall off. All of the three preceding classes of influences have their effects in the extent of the vibrations, which only we need consider in practice. I may say here, however, that a cylinder watch cannot be isochronized unless there is the correct proportion between the weight and diameter of the balance, the size of the cylinder, and the motive power. And further, the opening of the cylinder and the impulse action of the escape wheel must be such as to give, if not the best, at least fully satisfactory, performance.

(119) Lastly, there are the irregular influences, among which may be mentioned unavoidable imperfections in the metal or form of the spring, unequal hardening or temper, imperfections in the balance, pallets, escapement jewels, etc., already mentioned. A soft spring cannot be isochronized, and if it could it would not stay so. Even the mere bending of a spring, although it may have been restored to its former shape, produces an unevenness of texture at that point, and the lower the temper of the spring the greater is the effect of such treatment. If these spots are stronger than the rest of the spring they do not bend with the other parts, or not equally, and throw the spring out of shape; if they are not so stiff, they bend too soon and in the same result. If a spring is let out at the stand, the spring made where it was pinned will produce a stiff spot and interfere with uniform flexion of the spring. A beginner will frequently render a spring worthless for isochronal adjustment by numerous changes and corrections. It should be bent as little as possible, and when necessary it should be done a little at a time and repeated, rather than bend too much and then have to take back a part.

(120) This class of influences no foresight can entirely prevent, nor can we know in what part of the vibration they will occur, or how great they will be, until we ascertain by actual test. No theory can avail against their occurrence nor do away with their effects. This can only be done, if done at all, by proceeding at once to adjust it in the direction indicated by the test, until success is attained or found to be unattainable. And, from what has already been said of the first three classes, it must be plain that, for all practical purposes, the workman will find that nothing further is necessary in the isochronal adjustment than to secure the mechanical correctness of the different parts, (71, 82, 83,) and then to govern his proceedings entirely by the extent of the vibrations, and the times given during his trials.

(121) It is doubtless desirable that he should understand the theory as well as the practice of his art, but it is so small a task to sift out the truth from the multitude of discordant theories and opinions put forth on every hand by those who claim to know it, and unless he has both leisure and ability to give the subject a thorough study he will waste his time in investigating the theory of it at all, as hundreds of enthusiastic but unqualified workmen have found to their cost. The subject of isochronism is exceedingly difficult and abstruse, requiring for its elucidation the most complicated reasonings and investigations. Not only am I precluded from giving these by want of space and the exclusively practical role imposed upon me in these articles, but, if given, they would only be understood by those familiar with the very highest branches of mathematics and the mechanics of the both static and dynamic, applicable to the case. I shall therefore not try to pilot him through the maze of theory, but will now give him the practical hints and lessons derived from much study and practice, in as few words as possible, and try to avoid going into the whys and wherefores any further than is necessary to make clear the practical directions given, and which may be followed by any intelligent workman.

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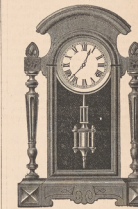
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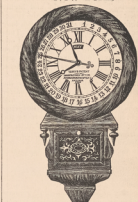
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Artificial French Jewelry.

The Parisian master is a critic of precious stones; he knows how to cut, how to mount, and, immediately afterwards, how to imitate them; he is an artist in enamel, mosaic, and gilding; he can amalgamate gold with silver, producing every kind of splendid illusion. Jewels, true or false, are in constant demand, and for the production of the latter variety a philosopher's stone of some sort must be found, which shall convert cheap substances into glories. The false French diamond, for which so enormous a desire has for years been exhibited at Paris, was, until lately, the very centre of this sparkling commerce. It is a bit of colorless paste, superimposed upon another, with a daring central radiance, both perfectly white, except for the prismatic colors incessantly playing through them.

The ordinary materials employed in the fabrication of false precious stones are of a very commonplace character. A Parisian chemist, engaged upon these manipulations, may be required to make a false diamond out of white sand; first, he washes it with hydrochloric acid, and then with simple water. Next, he calcines sodium borax, and oxide of arsenic are subsequently added, and a perfectly lucid combination results; but when the Parisian artificers come to the lovely dark light burning in and bursting from the heart, for which the stone is famed, in all its hues—white (the rarest), pale blue, ruby tinted, vermilion, milk colored, violet, and green. The Jews of Amsterdam will charge you a hundred guineas for a sapphire! but buy a little strass and oxide of cobalt and you can make one for yourself. Little need be said of the Parisian fabrication of chrysoberyl, chrysoptals, and "floating lights," which are really not jewels, in the strict sense of the term. The last known in the along of the French market as saphyrolines, are of an asparagus green, rather shell-shaped, with two refractions, and pretty enough when flashing under a glass of champagne. The imitation of ruby—always providing that mere red glass and the other pitiful ideas of the arcanes are out of the question—great facilities have to be overcome. Properly speaking, there is only one ruby (known to the lapidaries as the spinel), of a tender red; the Oriental, Barbary, and Brazilian are generally sapphirine, amethysts, or topazes. The color of the true stone may best be described, perhaps, as a combination, exquisitely delicate, of rose and cherry, but some are wine-tinted, or of a violet green, or tinged with yellow. It is astonishing how far a mixture of white lead and pulverized and effluents clint will go in competition with the jewel beds of India. So with emeralds; the same paste that is used for artificial diamonds is blended with a precipitate of oxide of copper, and the green gem sparkles brilliantly. The garnet requires paste dyed with the "purple of Cassius"; it is, however, exceedingly difficult to imitate its lurid ray. Oxide of cobalt and the Cassian purple will produce a beautiful semblance of the amethyst, though a better is obtained by a mingling of white sand, treated with hydrochloric acid, red lead, calcined potash, calcined borax, and the purple. Thousands of these mock gems are annually sold, at considerable prices; and thousands of them are worn by those who would have the world believe in heirloom jewels.

The manufacture of false pearls, which had its origin in the French capital, and thence spread to Italy, is exceedingly curious. As its foundation are used the scales of the blay, a small flat fish, with a green back and a white belly, the latter being of a very silvery appearance, and easily detached. The scales are scraped into bowls of water, dried in a horse-hair sieve, melted, and converted into "essence of the East," to which is added a little gelatine, and this mixture is spread, with the utmost care, over delicate globes of glass. When cool, these are pierced and filled with white wax to give them the necessary solidity and weight. Occasion-

ally, real opals, powdered, are used for the most costly kinds. The trifling importation of "Venetian pearls" are glass, and their production presents no difficulty.

Infinite care is bestowed upon the mounting of spurious gems by the French artificer. He has to consider how his slush settings—they must be sham, since he must sell them cheap—are likely to suffer from exposure to the atmosphere or from the action of heat, water, and acids; and he resorts to copper, lead, platinum, iron-steel, gold, silver, and their amalgams accordingly. The history of their manipulation by his or several sets of hands, the softening, the purification, the moulding, the washing, the hammering, the melting, the coloring or bleaching, the chiseling, so forth, would about occupy an entire technical dictionary. There are instruments for stamping, instruments for welding, instruments for soldering. One workman chisels, another files, another stands at the laminating machine; the fourth bends over the delicate enameleur's knife, sharp as a diamond's edge, and nearly as hard; a fifth subjects the completed work to a microscopical examination. This industrial economy is peculiarly interesting, the diversity of aptitude, of course, encouraging the division of labor.

Reverting to the French meretricious jeweler's other arts—those of coating common with precious materials, and enameling, few have any idea of the cost at which these tricks in manufacture are carried. The ingenious and cheap French enamel, white or colored, made up into rings, collars, and bracelets, brings a great profit to the workmen, and is really attractive. But it requires time and study to create a mastery over this art. There is the fixing of the translucent glass upon the metallic surface, the painting of the vitreous plane, the choice of tints, the subtle application of heat, the consideration of chemical action exercised by one oxide upon another, and due admixture of materials. Then, the engraving of enamels is a task requiring all possible exactness and tenderness of touch. Gilding, or as the Parisians style it, "gold" work, calls into requisition methods the most various, the oil, the hot, the cold the bronze, the copper, the steel, and the ether; not the magic of silvering is scarcely less intricate, especially when the surfacing is to be totally false, or what is termed "argenterie des charlatans." As for coating paper with gold, which is quite different from gilding, this belongs altogether to a higher artizanry, applicable also to lead, and even to iron.

The manufacture of steel trinkets by the French is of old date, and the finish and polish of the fancies produced for the Palais Royal by the artificers of the riotous Faubourg St. Antoine have never been excelled, even by the ambitious mechanics of Austria, who are Dutch in their perseverance, and Italian in their taste. But after all, these artists aim mostly at the imitation of jewels and gold.

A number of workmen in Paris have, for many years, been dependent upon the mock jewelry industry, and thrived by it. It is not by any means a degrading business, simply because the deception is, in fact, no deception. It is avowed in the marketplace; the objects are sold as shams; no one of common sense or knowledge could take them to be anything else; but they bring, or have usually brought, to the artificer of Paris an enormous annual income.—*British Trade Journal*.

It is well known the nickel-plating is very apt to crack and peel off when deposited on objects which are in danger of being bent, such as spoons and forks, by reason of the hardness and brittleness of nickel, being in this respect very unlike silver, which will adhere when silver-plated objects are bent, by reason of its ductility. Mr. H. T. Brownell, of Hartford, Conn., has conceived the luminous idea which he has patented here and in England, of annealing such nickel-plated objects, by first thoroughly drying them off, and then placing them in dilute bath and heating to about 500° or 700° Fahr. It is claimed that nickel-plated objects thus treated can be bent and stretched without cracking or splitting off the nickel coating.

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Curiosities of Clocks and Watches.

By EDWARD J. WOOD.

In the South Kensington Museum is a gold watch-case, chased and embossed with a mythological subject. It has perforated arabesque work borders and raised medallions, containing emblems and figure-subjects. It is believed to be of French manufacture, about the year 1700. It was purchased for twelve guineas. In the same collection is a silver watch, the inner and outer cases of which are ornamented with openwork. The diameter of this article is two inches and a quarter; the maker's name is "Ackers, London;" the date is the early part of the eighteenth century; and it cost the nation £4.

In the "Tatler" for January 21st, 1709-10, appeared the following advertisement:—"A plain gold watch, made by Thompson, with a gold hook and chain, a cornelian seal set in gold, and Cupid sifting hearts, was dropped from a lady's side in or near Great Marlborough Street, on Thursday night last. Whoever took it up, if they will bring it to Mr. Plaistow's, at the 'Hand and Star' between the two Temple Gates, in Fleet Street, shall receive five guineas reward. John Hammond." The house bearing the sign of the 'Hand and Star' is of very ancient date; it bore that name in the times of Edward VI, Mary, Elizabeth, when Richard Tottel published law books there. It then was, as it now is, numbered 7 in Fleet Street, and is in the occupation of Messrs. Battersworth, the legal publishers. In the number of the "Tatler" next following the one above named appeared this letter, dated January 23rd, 1709-10:—"Mr. Bickerstaff, I am bound in justice to acquaint you, that I saw an advertisement in your last paper about a watch which was lost, and was brought to me on the very day your paper came out, by a footman; who told me, he would have brought it, if he had not read your discourse of that day against avarice; but that since he had read it, he seemed to take a reward for doing what he ought to do to me, an air, your most humble servant, John Hammond."

We read in the 'Postman' for April 13th, 1710, as follows:—"Lost, in White Conduit Fields, or thereabouts, a silver pendulum watch, with a silver chain and a brass seal to it. Whoever brings it to Mr. Greentree, at Wobsey's Folly, shall have a guinea reward."

In the "Tatler" for November 2nd, 1710, is an amusing paper, purporting to be an advertisement of certain articles which had been stolen from Lady Farlingdale by her serving-woman. Among the many articles enumerated, as part of my lady's paraphernalia, is "a large new gold repeating-watch made by a Frenchman."

Steele, in the "Tatler" for December 16th, 1710, in reference to the prolixity of some talkers, says:—"For the latter estimation of these orators and story-tellers, which I look upon as very great pests of society, I have invented a watch which divides the minute into twelve parts, after the same manner that the ordinary watches are divided into hours; and will endeavor to get a patent, which shall oblige every club or company to provide themselves with one of these watches, that shall lie upon the table, as an hour-glass is often placed near the palpit, to measure out the length of a discourse. I shall be willing to allow a man one round of my watch, that is, a whole minute, to speak in; but if he exceeds that time, it shall be for any of the company to look to the watch, or to call him down to order. Provided, however, that if any one can make it appear he is turned of threescore, he may talk two, or, if he pleases, three rounds of the watch, without giving offence. Provided also, that this rule be not construed to extend to the fair sex, who shall still be at liberty to talk by the same watch; that is now in use would likewise earnestly recommend this little automaton, which may be easily car-

ried in the pocket without any inconvenience, to all such as are troubled with this infirmity of speech, that upon pulling out their watches, they may have frequent occasion to consider what they are doing, and by that means cut the thread of the story short, and hurry to a conclusion. I shall only add, that this watch, with a paper of directions how to use it, is sold at Charles Lillie's. Charles Lillie had a shop at the corner of Beaufort Buildings, in the Strand, where he sold snuff, perfumes, and such things, and took in letters for the "Tatler" and "Spectator," which were directed to him at the desire of Steele, who befriended him greatly.

At a meeting of the British Archaeological Association, held on April 27th, 1859, Mr. John Clutton exhibited a richly-chased silver watch-case of the time of Queen Anne. It was two inches in diameter; the upper ring being decorated with flowers and scrolls; the lower part having in its centre a nude figure of Pallas, the goddess of war, seated, and equipped with helmet, spear, and shield; in the distance was a boat. The surrounding border was divided into eight cartouches, two occupied with vases of flowers, and two with profile busts, one being a bearded male, the other a female. The first might have been intended for the Druid, and the second for Queen Anne, for, although differing from her later portraits, it resembled some of her earlier medall. At the same meeting, Mr. Alfred Clutton called attention to a watch-case of gilt metal, barely two inches in diameter, elegantly chased with flowers, scrolls, a seated female figure, and three standing warriors. This specimen was of the time of George II, and apparently the work of George Michael Moser.

In the South Kensington Museum is a gold repeating watch, the inner case of which is richly chased and perforated, and bears the royal arms of England. The outer case is embossed with a hunting subject. The maker's name is "Z. Michan George Albrecht." The length of the article is two inches and a quarter, and the width one inch and seven-eighths. This watch, which belonged to the Countess to George I. It was purchased at the Bernal sale for 15*l*. In the same museum is a circular watch in a rock-crystal, facet glass case. The maker, about 1720. Its diameter is one inch and three-quarters; and it was purchased for 12*l*.

Mr. H. De Mere has a watch-case of gold filigree, which belonged to the Chevalier de St. George, the "Old Pretender," is of Italian make, and of the eighteenth century.

In 1721 appeared the following advertisement:—"Lost on Wednesday the 11th instant (as supposed between Leadenhall and Spittelfields Markets,) a small Gold Watch, made by Anthony Harrison in Birchen Lane, with a green spotted Blood-Stone, hanging to a black Ribbon, set in Gold; and engraved, the Arms, a Lyon Rampant over three Bars; the Crest, a Grey's Head with a Cornet. If offered to be sold, pawn'd, or valued, stop it, and give Notice to Mr. John Chadwell, Goldsmith, in Castle Alley, Birchen Lane, and you shall have Nine Guinea Reward, or no Questions asked."

In Sir John Soane's Museum, Lincoln's Inn Fields, is a thick silver watch, which was formerly in the possession of Sir Christopher Wren, who died in 1724. The face of it is "with centric and eccentric scribbled o'er."

The horizontal escapement was invented in 1724 by Graham, an apprentice of the celebrated Tompion, and to whom we are indebted for two of the most valuable improvements in clocks ever made, namely, the dead beat or Graham escapement, and the mercurial compensation pendulum. Graham's horizontal escapement is still extensively employed in the Swiss and French watches, but those of English manufacture it has been superseded by the duplex, and more recently by the lever, which is only the application of the dead beat principle to a watch. The inventions of Graham and Harrison, together with the art of jewelling the pivot holes of watches, only practised in England, gave to English watchmaking its pre-eminence in the last century such a pre-eminence that the wealth of every other country sought to obtain them.

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To the Retail Jewelry Trade.

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We want you to know that we still make nearly 600 patterns of hard solder rings, of every variety of style for men, women and children, that they are struck from 16 karat solid, without a single flaw, and put together with solder that is 90 per cent. coin silver, and that every ring is as well finished as the best Diamond work. They are all stamped and warranted to give entire satisfaction, and we ask of you to insist on a guarantee that they are the same hard solder ring set made, and confidently appealing to scores of the most careful dealers in the country for confirmation of our assertion.

We also offer a long line of solid 14 karat Crown, Amethyst, Coral, Roman Enamelled and Engraved sets, together with many other goods in our line, as low as any other Manufacturers in the land.

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Assaying Gold and Silver.

Should the globe contain much copper, easily recognized by its color, the heat will frequently come out flattened in shape. When copper is suspected to be in considerable quantities after the first cupellation, some more lead must be added to the globe, and the whole recupelled until the copper is forced off, as in a muffle assay.

Of course the lead used must be quite pure from silver, and finely granulated.

In this class of assay the loss in cupellation is not in the muffle assay, and is not taken account of by the practical assayer for mercurial, and the weight is frequently taken for correction are not added. The heat all through the operations should be kept as low as possible. In fact, in all silver assays, except scorification, the heat cannot be too low. Assays of the alloys of silver and copper can be made with equal exactness. The alloy may be submitted at once to the cupel; but Mr. Forbes recommends the addition of borax glass, about half the weight of the assay, and then fusing it on the charcoal in the reducing flame till it begins to rotate, and subsequently cupelling it, as described above. Generally speaking, lead equal to about the weight and a half of the alloy is sufficient, but if copper is present in considerable quantities, it is requisite to add from five to fifteen parts according to the table given for silver alloys. The resulting button must be recupelled if suspected of containing copper, but it is better to avoid this by employing a slight excess of lead, and finishing at once. If the button contains only a small quantity of copper, the assay may be finished at once, without previous contamination.

ASSAY OF GOLD.

The assay of gold ores is carried on in precisely the same method as that of silver; it presents less difficulty in fact.

It is highly essential that the ores should be thoroughly well ground up and got through an 80 sieve at least. Any flakes of gold that remain in the sieve must be carefully collected and assayed as alloys, and their value added to the amount of the sample, as will be explained. Of course, great care must be taken in getting a fair sample of the pocket sent for assay, as otherwise, rock of a low per centage might easily escape detection.

The furnace, crucibles, etc., are precisely the same as in silver assaying.

In the assay of gold quartz, which will probably be the mineral most presented to the operator's notice, it is usual to take 500 grains as the charge.

The three following mixtures will be found efficient, according to circumstances and character of the ore:

1—Gold Ore,	- 500
Red Lead,	- 500
Charcoal,	- 20
Carbonate,	- 600
2—Gold Ore,	- 500
Red Lead,	- 500
Borax,	- 150
Carbonate,	- 350
Charcoal,	- 20
3—Gold Ore,	- 500
Red Lead,	- 1000
Charcoal,	- 20
Carbonate,	- 100
Borax,	- 50

The mixture must be intimately mixed in a good sized crucible, with the same precautions as in silver ores. Some assayers recommend a thick covering of salt on the top, but no advantage accrues from this application. Give a good strong heat at the end of the operation, and pour as usual. The slags in this class of assay are very thick, but they seldom retain any metal; if very viscid, a little more flux added by means of the copper scoop, and a five minutes' brisk heat, will generally render them sufficiently fluid.

All gold ores, unless they are very rich, are much better assayed by this method than by scorification. In the scorification assay of rich gold ores about one part of lead is sufficient, or 20 grains of the ore, and 450 of lead. Unless the sample is very rich, it is better to take four scorifiers,

and afterwards scovify the four resulting buttons: the one resulting button can then be cupelled.

The cupellation of gold buttons is very easy. It does not vitalize like silver, and consequently a greater heat can be maintained in the muffle than in the cupellation of silver. At the brightening, if the presence of copper is suspected, a high degree of heat may be safely given, as copper has a very great affinity for gold. The accuracy of the cupellation can be judged by the appearance of the assay, precisely in the same manner as in silver cupellation.

ALLOYS OF GOLD AND COPPER.

Copper has a remarkable affinity for gold; much more so than for silver. We must, therefore, avoid a very considerable larger proportion of lead in the former class of assay than in the latter. Generally speaking, this is about double. For instance, in an alloy containing $\frac{2}{3}$ of gold, about twelve or fifteen times the weight of the whole alloy would be required and so on. The resulting button does not consist of pure gold, as it always contains a small percentage of copper. It does no harm to recupel the button, as gold is never lost in the operation. In case of recupelling, about six times the amount of lead is all that is required. This "sarcophage," however, is not reckoned in commercial assays. The presence of silver greatly facilitates the separation of copper from copper; whilst, therefore, silver is not already present in the alloy, a small quantity, say $\frac{1}{4}$ of 1 of gold, may be added to the assay. In order to find out the approximate value of the alloy, the touchstone may be used, or a preparatory assay taken. The touchstone test, however, is fallacious, unless performed by a very practised operator, and, therefore, no description is needed of the apparatus. It takes very little time to make a preliminary assay, thus: Cupel 5 grains of the alloy with about 100 of pure test lead, and note the result. Then, in the actual assay, add the proper proportion of lead and proceed as usual.

ALLOYS OF GOLD AND SILVER.

The operation of separating gold from silver is called "parting." It is performed as follows:

Take the button which results from the cupellation (in the case of gold and silver ores), and, after correcting for the red lead, weigh it on a delicate balance. This equals amount of gold and silver combined. Now take two and a-half parts, or a trifle less, of pure test silver, and wrap the gold button and the silver up in a piece of sheet lead. Place a cupel in the muffle, and, when at a good heat, put in about six parts of test lead; when melted, drop in the sheet lead and contents, and cupel as usual. When cool, place the button between two pieces of paper, and flatten it by repeated blows with a hammer on an anvil. Clean it well, and then drop it in a parting flask. Now pour on it three or four spoonfuls of acid solution, composed of one part by measure of nitric acid and two and a half of pure distilled water, and allow to boil for fifteen minutes. Carefully decant, and wash once with warm distilled water. Then pour in rather more of an acid composed of half nitric and half distilled water, and allow it to boil for twenty minutes or rather longer. Now decant carefully, as before, and wash the residue with warm distilled water. To get the piece or pieces of gold out of the flask, fill this latter up to the brim, and place a small clay or porcelain crucible on the top, and press it down with the forefinger; take hold of the bulb of the flask, and suddenly turn it over top-sy-turvy on the table. The gold falls to the bottom of the crucible, and the flask can be lifted out very gently and slowly. If this is effected well, very little water comes out into the crucible. Decant off any water that may be in the crucible, and gently dry off the moisture. When tolerably dry, place the crucible, with the gold in it, in a good hot muffle, and ignite it thoroughly. Now weigh it up, and the difference is the amount of silver in the ore or alloy.

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1. Fine gold, 18 dwts, 12 grs, fine silver 1 dwt, fine copper, 12 grs. 2. Dry colored Gold Alloys. 17 Karat. Fine gold, 12 dwts, fine silver, 1 dwt, 10 grs, fine copper, 4 dwts, 17 grs. 3. Another, 18 Karat. Fine gold, 1 oz, fine silver, 4 dwts, 10 grs, fine copper, 3 dwts, 12 grs. 4. Another, 18 Karat. Fine gold, 15 dwts, fine silver, 2 dwts, 4 grs, fine copper, 2 dwts, 19 grs. 5. Another, 18 Karat. Fine gold, 18 dwts, fine silver, 2 dwts, 18 grs, fine copper, 3 dwts, 18 grs. 6. Another, 18 Karat. Fine gold, 1 oz, fine silver, 2 dwts, 6 grs, fine copper, 3 dwts, 12 grs. 7. Another, 20 Karat. Fine gold, 1 oz, fine silver, 2 dwts, fine copper, 2 dwts, 4 grs. 8. Another, 22 Karat. Fine gold, 18 dwts, fine silver, 12 grs, fine copper, 1 dwt, 3 grs. 9. Gold solder for the foregoing alloys. Take of the alloyed gold you are using, 1 dwt, fine silver, 6 grs. 10. Alloy for Dry Colored Rings. Fine gold, 1 oz, fine silver, 4 dwts, fine copper, 4 dwts, 6 grs. 11. Solder for fangs. Scrap gold, 2 ozs, fine silver, 3 dwts, fine copper, 3 dwts, 12 grs. 12. Dry Colored Scrap reduced to 30s. Gold Colored scrap, 1 oz, 6 grs, 12 grs, fine silver, 2 dwts, fine copper, 17 dwts, 12 grs, spelter, 4 dwts.

DRY COLORING FOR THE FOREGOING.

Polish your work well and for every 2 ozs, take saltpetre, 8 ozs, alum, 4 ozs, salt, 4 ozs, melt all together in a black lead pot, stirring with a thin iron bar when dissolving. Use the fire on a forge and argue it well with the bellows, as you can not make it too hot. Your polished work being well washed with soda, soap, and hot water, is dried in box sawdust, afterwards covered with a thin layer of borax; annealed and boiled out, and again dried in box sawdust, and finally hung on platinum or silver wire. When the "color" in the pot assumes a brown yellow flame, the work is dipped in for two or three seconds and quenched with hot water diluted with muriatic acid, which removes any "color" that may adhere to the work. This ought to produce the desired color, but if it does not, repeat the process, gradually drying the work before re-immersion in the "color." The color-pot must be emptied immediately upon the forge, so that it may be ready for future use.

WET COLORED ALLOYS.

1. Fine gold, 1 oz, fine silver, 3 dwts, 12 grs, fine copper, 9 dwts. 2. Fine gold, 1 oz, fine silver, 4 dwts, 12 grs, fine copper, 10 dwts. 3. Fine gold, 1 oz, fine silver, 4 dwts, 12 grs, fine copper, 10 dwts. 4. Fine gold, 1 oz, fine silver, 4 dwts, fine copper, 9 dwts, 12 grs. 5. Green Gold for Fancy Work. Fine gold, 1 oz, fine silver, 6 dwts, 16 grs. 6. Another Green Gold. Fine gold, 10 dwts, fine silver, 2 dwts, 2 grs. 7. Red Gold, for Fancy Work. Fine gold, 3 dwts, fine copper, 2 dwts, 12 grs. 8. Another Red Gold. Fine gold, 5 dwts, fine copper, 1 dwt, 6 grs. 9. Gold solders for the foregoing alloys. Take of the alloyed gold you are using, 1 dwt, fine silver, 6 grs, or 5 grs silver and 1 gr. copper may be used. 10. Solder for Repairing. Gold alloyed, 1 dwt, fine silver, 3 grs, pin brass, 1 gr. 11. Wet Colored Solder. Wet colored scrap, 3 ozs, fine silver, 10 dwts, fine copper, 5 dwts. 12. Gold, 15 Karat, 66s, or \$14 per oz. Fine gold, 1 oz, 18 dwts, fine silver, 12 dwts, 12 grs, fine copper, 10 dwts. 13. Fine gold, 1 oz, fine silver, 8 dwts, fine copper, 4 dwts. 14. Fine gold, 1 oz, fine silver, 8 dwts, fine copper, 4 dwts. 15. Fine gold, 1 oz, fine silver, 6 dwts, fine copper, 3 dwts. 16. Gold solder for the last. Gold scrap, 1 oz, fine silver, 5 dwts. 17. Gold good color. Fine gold, 1 oz, fine silver, 4 dwts, fine copper, 1 dwts. 18. Gold good color, or \$15. Gold cost 60s, or \$15, good color. Fine gold, 1 dwt, fine silver, 6 dwts, fine copper, 1 dwt, 10 grs. 19. Wet colored Scrap. Fine gold, 1 oz, fine silver, 13 dwts, fine copper, 4 dwts, 16 grs. 20. To reduce 22 karat into wet colored Gold. Gold coins, 4 ozs, 8 dwts, 20 dwts. 21. To reduce 22 karat into wet colored Gold with scrap. Coins, 1 oz, fine gold, 3 ozs, fine silver, 17 dwts, 12 grs, fine copper, 2 ozs, 1 dwt, 12 grs,

scrap, 3 ozs, 1 dwt. 22. Another way with scrap. Coins, 3 ozs, 1 dwt, 6 grs, fine gold, 2 ozs, fine silver, 1 oz, 1 dwt, fine copper, 2 ozs, 11 dwts, scrap, 1 oz, 6 dwts, 18 grs. 23. Another way with scrap. Coins, 2 ozs, fine gold, 3 ozs, 3 dwts, 8 grs, fine silver, 1 oz, 1 dwt, 4 grs, fine copper, 2 ozs, 10 dwts, 12 grs, scrap, 1 oz, 6 dwts. 24. To reduce 22 karat to ordinary wet colored Gold without scrap. Coins, 1 oz, fine gold, 1 oz, fine silver, 6 ozs, fine copper, 4 ozs, 14 dwts. 25. Another way without scrap. Coins, 1 oz, fine gold, 2 ozs, fine silver, 13 dwts, fine copper, 1 oz, 11 dwts. 26. Another way without scrap. Coins, 2 ozs, fine gold, 6 ozs, fine silver, 1 oz, 14 dwts, fine copper, 4 ozs, 2 dwts.

TO WET-COLOR THE FOREGOING ALLOYS.

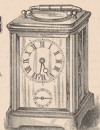
For 5 ozs. of work take saltpetre, 10 ozs, alum, 8 ozs, salt, 8 ozs, all pulverized and muriatic acid, 2 ozs, dissolve the ingredients gradually in a black lead pot. When it boils up, add the acid, and stir the whole with a wooden spoon. Having annealed your work and made it perfectly clean, tie in small parcels with platinum or fine silver wire, and when the color boils up immerse it therein for ten minutes, moving it about to ensure a perfect contact with all parts of the surface. Then take it out and rinse it well in boiling water, then immerse in the color again for 14 minutes and rinse well once more in fresh hot water. Now add 2 ozs. of fresh hot water to the color in the pot, which will cause it to sink. When the work is in your work for 1 minute, rising in fresh hot water again, when it will begin to brighten. Now immerse your work for half a minute longer, and rinse for the last time in clean hot water, when it will appear of a most beautiful color.

The Culwark's Combs.

Leaving the thrumstone through a small door on the left hand side, we find ourselves on an extremely narrow veranda, which encircles a small square well which occupies the centre of the palace from end to bottom. Above we see similar verandas, and a number of natives looking over the railings. Beneath are a number of Arab and other soldiers, looking watch over several things, among them a sacred flag which is hung across the well on occasions of high festival. On the opposite side are a number of closed stanchion windows, which guard the jewel-room, or jemdarikha. Moving to the right there are rooms which look like dungeons, and are guarded by sentries. At the end of the veranda we enter a little close-smelling room, which would be dark were it not for the light of some wicks thrown in a salver of oil—a light which, we are told, is never allowed to be extinguished, so that it to some extent resembles the holy fire of the Parsees. Here, in a corner on the left, is a door—the outer entrance to the jewel-room. After some delay, an elderly Mahatta makes his appearance and opens the lock, and we enter a room which is as black as night and awfully stale smelling. One of the grated windows is open, the well is thrown open, and by the little light thus obtained we perceive a number of shelves, which are loaded with State armoires. Another ponderous black door being unbarred, we enter a dark room—the jewel-room. While a window is being opened, we prepare to be surprised with the flash of a thousand jewels, but are rather disappointed to find only a number of iron-clamped chests of drawers ranged round the room. But these drawers contain the State jewelry, worth 250,000,000 sterling report say, and on the custodian pulling out one of the deep drawers in a central chest, and producing enormous morocco-covered ussies, which are opened and we have no need to be long disappointed, for a sight of a novel description meets our eyes. Here in one case lies displayed a breast-piece composed of two columns of diamonds, numbering twenty-nine in all. All the diamonds are beautiful, but there are three in the pendant of ten which are conspicuously so, while one of these deserves to be no less magnificent. This particular one occupies the centre of the pendant, and is, I believe, known as the Star of the South. It is nearly as large as a rupee, and its brilliance would, if you

Schuyler, Hartley & Graham,
IMPORTERS,

TRAVELING CLOCKS



MARBLE & BRONZE

CLOCKS,

Bronze Figures and Ornaments.

CORAL JEWELRY,

OPERA GLASSES,

FINE WATCHES, &c.

WITH OR WITHOUT ALARM.
Striking hours, halves & quarters.

REPEATING & CATHEDRAL

CHIMES.

20 & 22 JOHN STREET, 19 MAIDEN LANE,
NEW YORK.LONGINES WATCHES
AND
WATCH MOVEMENTS.

WARRANTED.



LONGINES REGISTERED.

KEY AND STEM WINDING, IN NICKEL AND GILT,
For Ladies and Gents.

With Interchangeable Parts—Uniform in size and quality throughout their respective grades.
For Sale by all the leading JOBBING HOUSES in the UNITED STATES.
Finished Watch Materials constantly on hand and supplied at the shortest notice.

L. & M. KAHN,
Importers of WatchesSole Agents for the JAMES KAHN, E. BOURQUIN & FILS.
ALPHONSE MATILE WATCHES,10 Maiden Lane, New York.
Manufactory, 5 Rue des Alpes, Geneva, Switzerland.

JACOT FRÈRES,

Manufacturers and Importers of

WATCHES,

51 Nassau Street,

Manufactory at LOCLE, Switzerland.

NEW YORK.

A. HOURIET,

Importer of Watches

OF EVERY DESCRIPTION.

Sole Agent for the Celebrated A. Huguenin & Sons Watches, of Locle, Switzerland.
Sole Agent for Ph. DuBois & Sons Fine Stem Winding Nickel Movements, of Locle, Switzerland.

P. S.—These Movements being all of uniform size, it requires but a small assortment of cases to be kept in stock.

No. 41 Maiden Lane, New York.

P. O. Box 2725.

were inclined to be more poetical than concrete, remind you of nothing so much as a mass of Indian sunlight, gathered from the haunts of the sun boats upon the greatest intensity, and compressed into the sparkling black before us. This diamond set Klondike 250,000, and, like all great diamonds, has a history, though not such an interesting one, perhaps, as the Nancy diamond, which, you will remember, was found in the body of a servant of Baron de Sancy, who had been deputed to carry it as a present to the King of France, but, being attacked by robbers on the way, swallowed it in order to baffle their attempts to find it. According to Harry Emanuel, one of our standard authorities on the history of great diamonds, the Star of the South was found in 1853 at Bogagem, in the Province of Minas Geraes by a negro. When rough it weighed 2544 carats, but since the cutting it weighs only 125 carats. It is of an oval form, and was cut by—and was, before it found its way to India and tempted the Gaikwar, the property of—Mr. Coster, of Amsterdam. It is not perfectly white and pure; but nevertheless, it is reckoned one of the finest large diamonds in the world. The large oblong diamond fixed above the Star is flat, and possesses nothing like the purity and brilliancy of its great rival. It cost \$250,000. The whole breast-piece of diamonds cost over half a million sterling, and is one of the most beautiful necklaces of that description extant. Whence have finished admiring the Star of the South and its seventy-eight multidiamond companions, we are shown a necklace composed of a number of chains of pearls, one of remarkable size and purity. This necklace is valued at \$250,000. I have been told that pearls do not retain their beauty for more than fifty years; and I could not help thinking it a pity that fate would not permit such a thing of beauty as this necklace to remain a joy forever. Drawer and drawer is opened, and case after case of jewels displayed, until the miserable duncun seem to begin to look radiant. Rings, with stones in them large enough to stretch across three of your fingers; necklaces of diamonds, mostly flat and dull-looking, with pear-shaped emerald drops; nose-rings of pearls and emeralds; earrings of wheels of diamonds, and chains of gold; these and similar curiosities displayed in succession before our delighted eyes until we are sated with sights, and leave the old Malabar, who has watched the goings out and comings in of the jewels for twenty or thirty years, to put the cases back into the drawers, and bar and double-bar the doors and windows of the dungeons which compose the Jewelkhana. —Once a Week.

Tea Sets.

The newest tea sets are square Japanese in oxidized gilt, and engraved with gilt and chased flowers, birds, and butterflies. In the Elizabethan style, a set of burnished silver has a base of silver and gilt representing Neptune and sea-monsters. A satin-finished set is engraved in gilt by hand in the finest details; an exquisite kettle is included in this set, with lightly burnished lid and handle. Another set, made of satin in satin finish, with base of gilt and silver, represents the ancient Greeks mounted and in armor, going to battle; a coffee set is combined with this, a silver butter dish. A beautiful bridal set of satin-finished silver was bordered with oxidized silver. The bar-els represent a bridal procession; cups and saucers with garlands of flowers, the bride pair, an altar with vapor from the burning offerings, birds, and flowers. Another bridal set is in oxidized *repoussé*, work, wonderfully elaborate. A silver-gilt dressing set is minutely engraved, and has sets of forks and spoons to match. A silver tea-set of six pieces is enameled with blue forget-me-nots. An elaborate silver-china set was engraved in gold butterflies, flies, little children, birds, and flowers; this is complete to the lamp and porringer. A dinner-set of twenty pieces has a magnificent *repoussé*, champagne malle lined with silver, with bar-els of winged gods driving steeds; the punch-bowl is lined with burnished gold. A new style of fruit-stands is in the shape of an ancient war chariot gilded by figures in armor of

satin-finish silver; heads of fauna from the hubs of the wheels. An *opergue* of silver is surmounted by a figure of Aurora in ivory drapery, with red and golden stars, and wreathed with garlands of burnished gold. The side pieces for fruit and flowers are decorated with *repoussé* work. The nickel plate cases of four different cases of nine dozens for a set, Raphael pattern, in satin-finish silver, with ornamentation of gilt. New styles of pickle-dishes and silverware saucers are red and golden stars, with gold volutes. Quaint little silver tubs lined with gold are for mustard, pepper, and salt. An elegant trolley set of kettle, lamp, and standard, sugar bowl, and spoons, is in satin finish, silver and gilt, globe shape. Satin-finish silver dishes are long slender ovals. Others have bar-els representing Cors and Neptune exchanging the rules of their kingdoms.

Advertising.

A LETTER THAT TELLS ITS OWN STORY.

Editor *Jeweler's Circular*,

Dear Sir:—It is not often that even a persistent advertiser can trace to its source the benefit he receives, and when such is the case, and especially when it is remarkably so, it seems to me no more than fair for the advertiser to acknowledge the fact. Some months since you inserted in the *Circular* an engraving of my chronograph, entitled "Taking advantage of the situation." It had received numerous gratuitous notices in many papers—religious and secular, and I had received many letters of inquiry in answer to such notices and advertisements. But found I received more answers from your *Circular* than from all other sources put together, in fact ten times more. I received orders from almost every state and territory west and south, but, singular to state, hardly an answer from an eastern state. I have often wondered at this, and the only reason for it that I can think of is this, that there is more progressiveness in the west and south than there is in the east. The *dash* and *dash* "go west," while the slow coaches stay in old quarters.

I have received more orders for 300, 100 and 50 at a time from western and southern jewelers than I have for single chronographs in the eastern states. Perhaps you would like to know the effect the chronograph has had upon my own business? Well, while all my neighbors are complaining of dull times I have sold more every month this year than I did last, except the spring. The summer months over \$1000 each above last year.

I have done no other advertising than the chronograph, and certainly think that to it I owe all the increase this year. I have made no noise about it either, each customer, as *de loances* the store, is shown the picture, invariably they are pleased with it, and when handed one to take home the effect is magical, they go away more than pleased and carry with them a remembrance which they will always keep.

Again thanking you for the good you have done me.

Believe me, very truly yours,

J. H. JOHNSON.

A large deposit of amber has been discovered in the Kurische Haff, near the village of St. George, about twelve miles south of Memel. It has been known for many years that amber existed in the soil of the Kurische Haff, from the fact that the dredgers employed by the Government for the purpose of clearing away the shallow spot near Schwarzwitz that impeded navigation had brought up pieces of amber; these, however, were appropriated by the laborers, and no particular attention was paid to the matter till recently. Some speculative persons have made an offer to the German Government, not only to do the dredging required at their own expense, but also to pay a daily rent provided the amber they might find should become their own property. The proposal was accepted, and the rent fixed at twenty-five thalers for each working day. The dredging was begun by four machines, worked by horses; eighteen other dredges and two tugboats, with about 1,000 laborers, are now engaged in the industry. The ground covers an area of several miles, and a yearly rent of 72,000 thalers is paid by the company to the Government.

MORGAN & HEADLY, Manufacturing Jewelers.

No. 613 Sansom Street,

PHILADELPHIA.

Vest, Opera, and Guard Chains, Stone Cameo, Coral, Amethyst and Gold Sets, Enamelled and Roman Bands, Roman Lockets, Stone Lockets, Studs and Buttons, Stone and Plain Gold Rings, Gold Spectacles, Eye-Glasses, &c.

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LOUIS A. SCHERR,

WHOLESALE DEALER IN

Watches, Jewelry, Silver & Plated Ware,

OPERA GLASSES, SPECTACLES, FANCY GOODS,

Watch Materials, Tools, Glasses, &c.

726 CHESTNUT STREET,

PHILADELPHIA.

Formerly 408 Chestnut Street,

SAFER & DOUGLAS, MANUFACTURERS OF Fine Jewelry, 11 MAIDEN LANE, NEW YORK.

Factory. No. 355 and 357 Mulberry Street, Newark, N. J.

ENGRAVED & ENAMELED SETS, PINS, EAR-RINGS,

SLEEVE BUTTONS AND STUDS.

SEAL RINGS A SPECIALTY!

SPECIAL ATTENTION IS INVITED TO OUR

Amethyst, Topaz, Stone Cameo, Incrusted Amethyst, Incrusted Garnet and Sardonyx Rings.

LEO HAMMEL.

LOUIS RUNKEL.

L. HAMMEL & CO.,

Importers of Materials and Tools,

FOR WATCHMAKERS, JEWELERS & ENGRAVERS.

Spectacles, Opera Glasses, Watch Glasses, Silk Guards, Optical Goods, &c.

No. 9 Maiden Lane, New York

The Collector of Gems.

The collector of antique gems has this advantage over all other collectors of antiques, that modern forgeries of old engravings upon stone are really too expensive to be made, and would, in fact, probably cost more than the originals. The collector of old china, for instance, has constantly to be on his guard against fraud; there are so many tricks laid to catch him. For him Cookbrookdale prepares its imitable Chelsea vases and square-marked Worcester. And to catch his wares, Wardour street exhibits its fine lustred majolica ware, (signed and warranted to be by Maestro Giorgio, of Gubbio) which the Marquis Ginori is so fond of buying, and his heredit, by the gross at Doccia. And the buyer of pictures knows well that in garrets, not too far from Wardour street, genuine Roman bronzes are being constantly holed down for the inspection of the unwary. But once he has learned to distinguish a stone from a paste, the gem collector is in a measure safe from imposition. We were told only the other day a story in point by a London dealer, who has had an extensive and important collection of antique gems. Being anxious to see what could be done in this way by modern men, this gentleman commissioned the best seal engraver he was acquainted with to execute a small figure for him upon an onyx, after some Greek statue he had selected as a model. Having waited patiently for nearly a year, he at length obtained a pretty faithful, but very tame rendering of the original, and had to pay for the little gem a sum of about £25, for which he might have purchased four or five good antique stones of the same kind. If the seal engraver had been able, with all the appliances of modern art, to turn satisfactory forgeries at a remunerative price. But at the present time it certainly does not pay to forge antique gems. Even in Italy this art has been well-nigh lost.

Whitworth of England, the great machine-maker, has made a most delicate adjustment and register that in order to use the temperature of the room in which it is kept must be at an exact point, otherwise its indications are valueless, owing to the expansion of the metal composing it under varying temperature. This exactness of workmanship has attracted the attention also by the Pratt and Whitney Company of Hartford, Conn., who have for years been supplying foreign armories with special tools and instruments of accurate measurement. A set of steel gauges and gages, or templates, which they made for the Austrian Government, have never been equalled in this or any other country for exactness. They recently sent abroad for a set of Whitworth's plug and collar gauges which are the standard for size the world over, listening to manufacture sets for use in this country. A plug and collar gauge made by them is so accurately fitted that in order to get it on and off it had to be kept going in and out, the heat of the hand in doing so, so expanding the collar that if allowed to stand it would shrink tightly on the plug.

The *British Trade Journal* says:—The fine arts of Japan are abandoning their thrones. The art of China is well nigh dead; true, they still paint porcelain and carve ivory, with dim recollections of bygone splendors, but the old and good art is gone, and can never come again. The art of Japan is deteriorating and it would seem that the decorative arts of an Eastern people cannot bear the evil effect of the European market; Chinese art has died of luxury; and the fine arts, lacquered boards, work-boxes, and chessmen for exportation; and Japanese art is fast becoming moribund now that a sale can be found for hundreds of thousands of fans a year, with glove-boxes and tapestry in proportion. The workmen who have the exceptional skill required for the finest work, to whom have descended those secrets of workmanship and that familiarity with design which we find so extraordinary, will not continue to do fine work when

cheap articles of sale have begun to pay well. When Shanghai was opened for trade, delicate inlaid work was to be brought there; one large round table we know of which was bought for eighteen silver dollars; a similar work bought there now, at four times the price, is very inferior in design and workmanship. So a bronze vessel of exquisite finish, which cost forty silver dollars in Nagasaki a few years ago, a French bronze worker would not attempt to reproduce for less than six hundred francs. The native workmen here of European prices, and there is every probability that the Japanese finishers and engravers who did this wonderful piece of work are now engaged in making the common silver inlaid bronze vases and candlesticks, for poor workmanship and no particular design, for the European market.

Official List of Patents

PREPARED EXPRESSLY FOR THE JEWELLER'S

ISSUED BY THE U. S. Patent Office for the month ending Oct., 4th, 1882, relating to the arts and manufactures represented by the JEWELLER'S CIRCULAR.

105,500—Collets for Balance Springs of Watches.—Atz, Jewett, Lynn, Mass.

BRU—A collet constructed so that the inner end of the balance-spring may be located as near as possible to the center of the balance.

107,019—Screw Prosses.—J. E. Potter and A. H. Bickel.

BRU—The nut is made square, so that it may be tightened when worn. The lower collar of the thread passes freely over the lower screwhead.

107,020—Machines for Drilling Metal.—Jas. S. Belmont, Cory, Pa.

BRU—A reciprocating movement is given to a studied plate, by eccentric connections with the driving shaft. A series of small discs are attached rigidly to the series of bit shafts. The studs on the plate are made to enter holes in the discs, and serve as cranks to revolve again when the plate is reciprocated.

107,092—Watch Case Springs.—A. S. Bucklew, Colusa, Cal.

BRU—A watch case spring that may be readily fixed to different sizes of cases by filing the projections, said projections being made very thin and slight.

107,093—Automatic Escapements for Watches.—Frederick Pitt, Ottawa, Canada.

BRU—A removable piece holding the escapement and regulating devices, is held in place by a single screw, which operates a stop device for stopping the movements of the remaining parts of the works when the escapement is removed.

107,174—Watch Case Tools.—G. Hopkins, Walham, Mass.

BRU—The tool is provided with cutting and finishing edges for fitting watch cases.

107,193—Solutions for Cleaning Gold, Silver, &c.—G. M. Norwood, Beverly, Mass.

BRU—A solution for cleaning gold, silver, &c., formed of water, cyanide of potassium, ammonia water, acohol, oil of sassafras, or similar aromatic substance, and precipitated chalk.

106,772—Mainpring Attachments for Watches.—Marshall Wheeler, Big Rapids, Mich.

BRU—An attachment for equalizing the force of the mainpring, by drawing its outer end nearer the center when the watch is wound up, and the force of the spring is greatest, and retreating it toward the circumference as the spring is unwound, and its power decreased.

107,407—Watch Regulators.—R. S. Merston, Zanesville, Ohio.

107,437—Cleaning Gears.—G. McKinnin, North Ash Grove, Mass.

CLAU—The polished, flattened, and slotted reflector, C, as described, in combination with the open-set screw, A, and its series of supporting standards, D, of frame, B, all arranged and applied substantially as specified.

107,634—Hollow Staffs for Watches.—W. A. Belcher and D. J. Plummer, Ophir City, Utah.

BRU—A hollow staff, provided with a solid driven pin.

RECEIPTS.

6,610—Furnaces for Roasting Ores of Precious Metals.—James H. Boyd, Chicago, Ill. Patent No. 144,184, dated Nov. 4th, 1872.

BRU—One is pulverized, fed through hopper nearest the stack into the revolved desulphurizing cylinder, passed through connecting pipe into revolved roasting cylinder, and into the rotating barrel, A, and its series of supporting standards, D, of frame, B, all arranged and applied substantially as specified.

BRU—One is pulverized, fed through hopper nearest the stack into the revolved desulphurizing cylinder, passed through connecting pipe into revolved roasting cylinder, and into the rotating barrel, A, and its series of supporting standards, D, of frame, B, all arranged and applied substantially as specified.

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CROSS & BEGUELIN.



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These Movements are uniform in size and interchangeable in parts. It requires therefore but a small assortment of Cases to keep a full stock, and parts of all kinds will always be kept on hand to supply the demand.

Samples, for examination, will be sent on application, accompanied by satisfactory references.

No. 5 Maiden Lane, New York.

T H E

Jeweler's Circular

AND

HOROLOGICAL REVIEW,

A Journal devoted to the interests of the Watch and Jewelry Trade of America and the export of communication between all buyers and sellers in this particular branch of business.

This Journal will be forwarded to any address in the United States and Canada, for \$1.35 per Annum, payable in advance.

Correspondence solicited from all parts of the country, on subjects pertinent with the aim and object of the paper.

All communications should be addressed

D. H. HOPKINSON, 209 Pearl St., N. Y.

Our Agencies.

Those who are not yet our subscribers can obtain copies of this Journal by addressing any one of the following named gentlemen, who have kindly consented to receive subscriptions and advertisements for the JEWELER'S CIRCULAR:

THE PENNSYLVANIA WATCH CO., 418 Chestnut street, Philadelphia, Pa.

W. E. H. COOKLEY, No. 17 Merchants street, San Francisco, Cal.

SEN. ALEX. HECHLER, 20 Myrtle, Havana, Cuba.

NEW YORK, OCTOBER, 1875.

SPECIAL NOTICES.

POOL SALE.—A Wheel Cutting Engine. A first class Cutting Engine will be sold cheap, or trade for a good Diamond. For particulars apply to

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us. Goods shrink. People began to fail. Then the less knowing, seeing how prosperous we all were in '65 and '66, when the country had just got its notes discounted and was going on in prosperity, wanted "no more money" and cried out for the government to get more discounts. For the government to get more discounts, they were to issue more greenbacks. Wiser men said "no—these notes are not money, they are only paper. If we issue the, worse we shall be off in the end. Let us live closely, stop trusting everybody and buying on credit, and be as tight as a drum. Let us get our notes in actual cash when they come due." The division in the nation is the same as between the men in business who are always getting on paper notes and trusting them with more notes, and those who insist in having out as few notes as possible, and paying them as they become due. Now, if the nature of things, this makes a man seem prosperous when he is not, and makes him careless and reckless. General business has been afflicted with just these some days, and the cause of it is a too little currency, but because we have had too much. We can put off the day of reckoning by issuing more notes, but it is an evil trick, and the day will come when the nation is mistaking people about a difference between the government and the individual business man. To be sure, many are tempted to go on paper, and bankruptcy as yet is not an ordinary remark, but this is more dangerous because you haven't the same means of holding it back.

In other words, inflation may be a temporary relief, as a man who is ill from the permanent effects of drink feels better for a moment for more drink. But it is sure to betray, and we cannot tell when. Now, our commercial prosperity depends largely upon our getting this element of uncertainty out of business. We have had it enough of late. The day of reckoning has radiated from Wall Street has been a curse to every true business man who was trying to earn a steady living by honest work, whether as farmer, mechanic, retailer or middle man. So long as we depend on money which is not the world's money, viz, gold and silver, which, like water, is not scarce, and is not hoarded by the mercantile community is at the mercy of this clique at Washington or, that in Wall St., who toss them up and down with throws and catches, in business or out, who live from hand to mouth and can lose nothing when the day of reckoning comes. It behooves every true business man in these days to make himself felt on the right side.

The Question of Credits.

It is a truism in business that every man is much at the mercy of his fellow man. To take an extreme instance, if a new dealer comes into a place and deliberately sets to draw custom, at a price which is below cost, and does not care for the business, if his capital holds out long enough, every other dealer established there. He may commit suicide in the process, but as capital is not scarce, and the laws of trade don't often permit this to be done in this wholesale way, yet its equivalent is done in a smaller degree. In the case of a man's hold on the character he has built up and which makes it worth while for people to continue to deal with him even after he has failed in his business, he can buy the goods elsewhere for, while on the other he obtains for him from those of whom he buys advantages of credit and honor to which his competitor is not entitled.

This illustrates peculiarly the vital necessity that credit should be based on the most careful estimates of character as well as capital. Those merchants who look far ahead, whose aim is to build up a steady, paying business that shall last, must see that their interest is altogether apart from the petty gain they make by the trade and fall out of it in a year, and altogether with the steady-going dealers who may be relied upon year in and year out. Every man who can promote business who has

the ideas or the push to make a place for himself either in manufacturing or distributing, should be welcomed into the trade, for no American business can, or should attempt to, do without the good help of men who are speaking of are not of this sort. They come in as freebooters; they disregard all sound business principles; they do their best to ruin the honest man; they get on paper notes and by they explain the secret of these by failing to pay their bills.

That there has been a tendency in the trade to rely on such men, especially if they hoodwinked the larger dealers by paying first orders in cash, cannot be denied. That this cannot go on, with safety neither to the paper note nor to the honest man that deserves credit should get it, and men that are not definitely known to deserve it should not. Otherwise the leaders of the trade put a premium on that dangerous recklessness which is misallied enterprise and do their best to knock the bottom from under those sound houses on which steadfast prosperity depends.

Too Honest Villains.

Happily there are not very many men who can be so successful in their villainy, but it is an exception to the rule. It needs a considerable education in villany to see the conscience into deadness, and a good many usually honest men, but who are sharp, allow themselves to be enticed into "sharp practice" only to find that it brings its own retribution. There are cases of this kind in the history of the trade, and stories one meets in business experience, sermons that preach themselves.

Not long ago a member of the trade in Mississippi, previously of good standing, thought he could do better at making a dishonest dollar than by turning over his honest penny. So he "failed." He was not smart enough to make a good villain, and he was not honest enough to keep to the straight path. It is only men deadened to conscience, brutes, who can safely put themselves in that category. And the more honest men, who are not of all pitiable sights, a really honest man, trying to be a rascal, is the saddest.

The Jewellers' Association.

The usefulness of trade organization is excellently illustrated by the success of the Jewellers' Association, which has been in existence but one year, yet is already accomplishing important results. Its first annual meeting was held on the 14th ult. at the rooms in Bond Street, when Mr. Seth W. Hale was chosen President, Mr. Philip Besinger, Vice President, and Mr. F. D. Taylor, Treasurer, for the ensuing year, and the work of the association during the time was very successful. The financial condition of the association is exceedingly satisfactory and the members expressed themselves highly pleased with its success. Such valuable information is so important, and the association has been collected which has hitherto been inaccessible, and it is believed by those interested that the association will be of great service to the trade.

Much of the credit in connection with the work of the association must be awarded to Mr. F. D. Taylor, the Secretary, whose efficient and faithful performance of his duties of his office is deserving of praise. In fact, the members of the association are thoroughly satisfied with the results so far as work, and feel that their investment in the work has paid well, and they declare the success of the organization established beyond peradventure.

The Parsee Merchant on Money and Mistresses.

[There are many Parsee merchants in a plain way. That is our apology for asking our readers' attention to the Parsee's recent utterances in the *World*.—Ed.]

The Parsee Community, Parsi, Bombay, has discovered that a mistress

and an irredeemable currency are twin sisters, and resemble each other as closely as eggs do eggs.

A mistress rests her fortune and station on the weak faith of her lover; so does an irredeemable currency.

A mistress is repudiated when a lover finds a suitable legitimate spouse; an irredeemable currency is likewise discarded when the people return to a sound and legitimate money.

A mistress continually represents to her lover the superior advantages of her relations to his sex, though she is all to him that a wife could be, she is only a mistress; thus an irredeemable currency urges that, though it serves the purposes of legitimate money, it is only a rascal.

A mistress is three times as expensive as a legitimate wife; an irredeemable currency also is three as expensive as a coin currency.

A mistress is always at a discount in decent society; ditto an irredeemable currency.

The repudiation of a mistress is only the question of time; so is the repudiation of an irredeemable currency.

The end of a mistress is the gutter; an irredeemable currency tends inevitably to the chiffonier's basket.

The Parsee appeals to every honest woman in the land whether the curse of rascals is the fate of her society and the sworn foe of decency.

The Whiting Mistake, Co. Fire.

The recent disastrous fire in the silver-ware manufactory of the Whiting & Co. is, perhaps, regarded as almost a trade misfortune and is universally deplored. The fire originated in the roof of the main building, where the factory is situated, and its gables, together with a great part of the machinery. The stone walls, three in number, standing one above the other, were so completely destroyed that the market and fortunately resisted the flames. The portion of the building containing the engine and boiler escaped with comparatively little injury, and the water power of the water power. The loss is however very heavy, and coming just at the busy season when trade is beginning to stir up again, it is a very serious blow to the company in dollars and cents. The company has, however, a large quantity of goods in stock in New York, and these, with the goods in the factory, will supply orders. It is hoped, until by increased production the time lost shall be made up.

The officers of the company speak in the highest terms of admiration of the conduct of the employees, who at the risk of their lives rushed to rescue the most valuable patterns, &c., and succeeded in saving a large amount of property that it would have taken months to replace, had it been destroyed. They express themselves as deeply touched by this display on the part of their workmen of devotion to their work, and as a further testimony to the cordial and excellent relations between employers and employed that are equally creditable to both.

With true American enterprise, the managers of the company set immediately at work to overcome the difficulties the fire had thrown in its way. In less than six hours they were at work again in several departments, and at this moment have every department under full headway again. The happy result is that the enterprise on one side of helplessness on the other, and the company thus repairs in its time of need the fruit of its previous care and liberal dealing.

Goodman and Friends:

We see with the utmost regret that you have suffered severely at your factory by fire, and we sympathize with you in your loss. We are sure your sincere sympathy in your work, and your devotion to the cause of the poor, will be very serious to you at this season. We trust the pecuniary loss as far as possible may be covered by good insurance and that there may be sev-

ing among the rolls and patterns which will let you up immediately. The "good will" of your customers and the trade needs to be insured for it does not burn up and will only wait your word to the line again with their more substantial evidences of sympathy. Our feelings towards you are such that we couldn't help holding out our hand in sympathy and wishing you haste and in re-establishing your business, and expressing the hope that your trials of the season may not suffer by this misfortune. Count us among your friends, waiting to do anything in our power to help you on, and we remain your truly,

The officers of the company desire us to express their thanks for these friendly and grateful favors.

We may suggest, of our own motion, that the practical method of showing sympathy in such an emergency is to strengthen the hands of sufferers in such cases by meeting all accruing obligations promptly and fully. The customary delay in the payment of insurance claims compels a sufferer by fire to use double capital for the time being, and strong as the Whiting Company is, we can well imagine that its officers would prefer to concentrate their efforts solely on the work of re-building instead of using a part of them in looking after their financial accounts. Prompt payment of bills on the part of customers should be the commercial rule in all such cases, and we trust to be excused in taking this opportunity to lay down a principle. Every man who has suffered a like misfortune knows this for himself; the expenses which rehabilitation involve mount up unexpectedly, and the necessary rebuilding of a great factory that has been the growth of years involves an immense expenditure. The Whiting Company is pushing the work with all the energy which has heretofore characterized its business dealings, and we simply suggest that its friends should endorse such enterprise, which is to the benefit of the whole trade, in the manner we have pointed out.

The Whiting Manufacturing Company has earned an enviable reputation not only in its energy and enterprise and the fairness and liberality of its dealings, but for the admirable character and artistic excellence of its great variety of goods, and the trade will be glad to learn that they are not to be denied these goods this fall. Success to it.

Editorial Gleanings.

A circular from the Jewelers' Association makes an announcement that will be received with general regret through the trade:

John Gorham, President, R. I. President of the Gorham Manufacturing Company, personal paper, went to protest in New York on the 21st inst. His failure is occasioned by large real estate operations in New York and Boston, and in no way impairs or affects the credit or standing of the Gorham Manufacturing Company, or any member of it. Their credit is undoubted, and resources ample sufficient to maintain its liberal and enviable reputation. F. E. Mousse, Secretary.

Mr. Gorham is well-known and highly respected through the country, and he will have wide sympathy in his personal misfortune. Identified as he has been with the enterprise and progress of the trade, the Company, its business stability is nevertheless entirely independent of his financial concerns, and we may add our assurance that the Association Secretary is confident that this failure will cause no embarrassment whatever to the Company. Mr. Gorham's assets are largely in excess of his liabilities.

Major Whittle, formerly the manager of National Watch Co., of Elgin, Ill., a gentleman universally esteemed, has entered upon a mission of usefulness in which he feels a deeper interest. Mr. Whittle has associated himself with Mr. Bell, and the two have reinforced the evangelists, Moody and Sankey, who have done such a good work in England. Chicago offers them a wide field for their labors, and if the major serves *Eternity* with half the zeal he has served *Time*, his success will be great indeed.

An ingenious manufacturer in the Lane has conferred a blessing on both dealers and wearers of spectacles, similar to that of a public benefactor who makes "two blades of grass grow where only one grew before." The "Patent Accommodating Spectacles and Eye Glasses," offered to the trade by Mr. Albert Lorsch, No. 37 Maiden Lane, enable the dealers to keep a full

stock of goods on small capital, and wearers to make one pair last as long as two. The title is somewhat unfortunate, for the word "accommodation" has a special significance in relation to the eye, and these glasses should properly be called the "interchangeable." The novelty consists in making each lens, of any degree of strength, fit into any frame; thus the dealer need keep but one full set of lenses and a single assortment of frames to have a simple stock, which one pair of glasses necessitate at least a dozen times as many pairs. Loss by breaking is common with all who use spectacles; by the use of these frames a broken lens can be at once fitted with new frames. The frames are made of gold, silver, steel and rubber, and the glasses are guaranteed to be of the best quality.

Trade Cossip.

Birmingham Jewelers complain of dull trade. Hard Pan facts were re-visited in the Ohio election.

An immense bank of coral has been discovered on the coast of Sicily.

England imported watches to the value of \$254,166 during the year 1874.

The jewelry store of Berny & Park, of Little Rock, Ark., was destroyed by fire on the 19th inst.

The Fall trade has opened very auspiciously in the South, and promises to go far beyond expectation.

Mr. Vitalis (Humm), a watch-maker at No. 371 Third avenue, has been robbed of four gold watches, valued at \$465.

"General Spenser" was asked a visitor for the day. "Right over there?" said that boy: "I ain't nowhere else."

Turquoise is the only precious stone that has ever been found in serotus, and hence the only one that we are sure exists beyond our planet.

The Treasury destroyers are about to present General Spenser with a clock. They're all proud to point to him and say, "He's a friend of ours."

Mr. Runkle, of the firm of L. Hummel & Co., one of the most enterprising firms in the Lane, has returned from Europe with a large and comprehensive stock of new watches and materials, optical goods, watch glasses and kindred supplies. Mr. Runkle has been absent several months and has secured many novelties for the fall trade.

Abraham Mulholland, a Chicago jeweler, was recently arrested in Baltimore on a charge of grand larceny, and with having security quit Chicago after removing all the goods from his store, amounting in value to several thousand dollars, and including over fifty watches and a considerable quantity of jewelry for repair. Mulholland was taken back to Chicago in charge of detectives.

Hymns has taken from our midst, an ornament of no rare value in our composing room, one that has long adorned the typographical art, and we must will do likewise, the family circle with smaller ornaments. Our best wishes go with Mr. Frederick, and his lady (Laura Kitchner), and hope that the happy pair may never get out of sorts and he ever ready for *joy takes* as they proceed through life.

Queen Victoria has guarded the royal jewels with additional care since the recent discovery in the Thames of a cash-box filled with keys made to fit the doors leading to the private apartments at Windsor Castle. The box was attached to a ring on the other end of which was tied to a branch lying in the water. By the drawing off the scales of the river the branch, with the ring attached, became visible. The police believe that a crew of thieves had arranged to steal the royal jewels.

A LIBRARY OF VALUABLE INFORMATION.—Webster's Unabridged Dictionary can be only be obtained by those who order a few copies in its critical examination. It is a library of valuable information in itself, containing admirably condensed articles on thousands of subjects, three thousand of which are illustrated by elegant engravings. The volumes containing the same amount of matter on various subjects, would cost hundreds of dollars. It is the clearest volume in the English language, except the Bible.

The Springfield Watch Co., of Springfield, Ill., although comparatively a young company, have achieved a high reputation for the excellence of their productions, and are rapidly winning their way to the favor and sale of the public. The distinguishing characteristics of these movements are the pallets and fork, which are constructed on established mechanical principles, possessing marked advantages of recognition, importance, whilst the construction of the escapement for preventing damage to the hairspring in case of breakage is universally conceded to be the most perfect and simple in construction that has so far been introduced. Another important feature which practical workmen will once recognize the importance is that the plates are not softened during the gilding process, and the jewels are polished by the use of the plates, and give greater durability to the watch. The description of a recent visit to the Company's factory by a representative of the Chicago Times, will be read with interest by every dealer.

LeBoutillier & Bride,

IMPORTERS,

10 Maiden Lane, N. Y.

NEW IMPORTATIONS OF

FRENCH CLOCKS,

BRONZES, MUSICAL BOXES,

—AND—

RICH FANCY GOODS.

SPECIAL NOTICE.

We are now prepared to submit to OUT OF TOWN CUSTOMERS Photographs of our Goods, in order to give dealers the advantage of seeing and ordering the latest designs. These Photographs will give the exact measurement and prices.

(P) Applicants unknown to us will please give city references.

FORMERLY

Shepard, LeBoutillier & Co.

CRYSTAL CHANDLIERERS

GILT, BRONZE & DECORATED GAS FIXTURES,

Fine Marble & Bronze

CLOCKS,

Bronze Figures and Ornaments in Greatest Variety, at Low Prices, Manufactured by

Mitchell, Vance & Co.

No. 597 BROADWAY NEW YORK.

"Medal of Special Award" by American Institute, 1872,

MITCHELL, VANCE & CO., 597 Broadway, N. Y.

"We find the above-mentioned Figures and Glass Chandlery, for design, excellence of workmanship and finish, to be the best production in the country and we may say, in our judgment, excelled by no other country in the world."

"We recommend a MEDAL OF SPECIAL AWARD for CHANDLIERERS and GAS FIXTURES, (Signed) JOHN W. CHAMBERS, Secretary.

"Medal of Special Award confirmed."

C. F. A. HINRICHS,

29, 31 and 33 PARK PLACE,

Cor. of CHURCH STREET, (Upstairs) NEW YORK
Successor to M. WERCKMEISTER.

IMPORTER AND DEALER IN

FANCY GOODS,

Glass Ware, China, Bronzes, Clocks, Toys, &c.

Sole Agents for the GLASS FACTORIES of the COMPANY "ANN," Namur, Belgium

Depot for ARCHERY, ORICKET and BASE BALL IMPLEMENTS
And for C. A. KLEMMER'S CELEBRATED GERMAN STUDY LAMPS.

Agent for ROGEE'S GROUPS in Paris, &c.

Price Lists sent on application.

Goods imported to order.

AMERICAN WATCH COMPANY OF WALTHAM.

NEW LADIES' STEM-WINDING MOVEMENTS.

Named Amer. Watch Co.

RIVERSIDE!



The above Movement is made in 8 size [English], has expansion adjusted balance, hardened and tempered hairspring and exposed pallets, and after one year's trial proves itself a thoroughly good and reliable Stem-Winder and Time-Keeper.

We have constantly on hand a full assortment of Gold Cases for the above movement in 14 & 18 karat, warranted plump quality, and unsurpassed for beauty of finish and style.

Dealers should see these Gold Watches complete before ordering Gold Cases elsewhere.

**The cheapest Lady's Stem Winding Movement ever offered
by any manufacturer, either Swiss or American.**

ROBBINS & APPLETON,

No. 1 Bond Street, New York.

No. 8 Summer Street, Boston.

No. 5 Tribune Building, Chicago.

The American Watch Trade.

VIEW OF A REPRESENTATIVE OF THE CHICAGO
TIME TO THE FACTORY OF THE SPRING-
FIELD (ILLINOIS) WATCH COMPANY.

An age of competition, this has become one of no easy victories. In the great race for excellence it is not an easy struggle. Superiority is established only at the price of effort, and the awards are given upon conditions gradually lessening. At a time when ocean steamers have reduced their running time to a matter of an hour, and railroads gain in accuracy nearly three thousand miles in a feat to remember, accuracy is a special feature without which competition would cease. In our vast and growing system of railroads, how many lines depend daily upon the single revolution of the second-hand of a modern watch. A day consists of not so many hours in the nineteenth century, but of so many minutes and seconds, and in the perfection of our modern appliances for measuring time, so many fractions of a second make up the sum of our daily toil. It is not necessary to enumerate the scientific requirements of accuracy. A watch which tells us day by day the minutes.

WITHOUT VARIATION

In a year is near enough for the most exacting practical purposes. The consequence of such a demand has within a very few years given an immense impetus to the manufacture of watches of a superior grade. European time-pieces at one time ruled the world. Swiss watches and English watches were the staples of the world's demand. The American watch and the English chronometer were standards like the Greenwich meridian. The American watch took to foreign interference in time or politics. He makes his own time-piece, and as a better one than his neighbor's, he is proud of it. The great feature of American watch manufacture is the application of machinery to the development. There are now in the United States several successful watch factories, which are supplying the continent with time as fast as possible, and threatening to overtake the sum and furnish him his daily time in all parts of the globe.

In this article it is the intention to call the attention of the reader to the watch factory in the political capital of Illinois, which is owned and managed by

THE SPRINGFIELD WATCH COMPANY, and which is rapidly growing in favor east and west. It is younger than some of our eastern companies, and has thus been enabled to profit by their experience, to avail itself of the most recent improvements in the art of making watches by machinery, and to supplying qualities of watches at less cost to the consumer which none of them have successfully attained.

The enterprise was inaugurated by a number of experts from older watch factories, who had studied out new inventions and foreseen the enormous advantage which their discoveries would give them in a new enterprise, where there would be nothing to stand in the way of a successful establishment. They were all experienced watchmakers, all experts in different departments, and while each was familiar with all the needs of watch-making, he had one special branch of it to his own. It was a strong team and promised good results, which promise has been faithfully kept. In seeking a place for the location of their factory they made a careful survey of many points in the east, and settled upon Springfield as possessing superior facilities for their enterprise. The location being adjacent to two great cities, St. Louis and Chicago, the capitalists of that city recognizing the advantages of manufacturing, were not slow in seeing that this would be beneficial to their city as well as remunerative as an investment, and promptly took hold of the project. Buildings were erected upon a plan drawn by an experienced architect who supervised their construction and built one of the most complete and best appointed watch factories in the world. The practical men interested who thoroughly understood the needs of a watch factory were competent to see that those needs were supplied. No sooner were they equipped with machinery and labor than they set to work to make watches. It took them time all at once to get their watches upon the market. Their superiority of workmanship and accuracy was recognized at once, and the demand soon created great sales. No great amount of advertising was done. The watches were the most advertised watches that could be put forward, and where seen they were made a note of. So well were they received by the public and the trade, that at the time of the panic the demand was already in excess of their power to supply it. Up to last year the company was manufacturing eight grades of watches. Since that date it has added a ninth, and as the "fifties." The watch is universally pronounced the best for the price in the market, and is already very popular. The capacity of the factory is 25 watches a day. The production last year averaged 33 watches a day, and at the commencement of the year was only 10. The company contemplates extending the capacity of the works as soon as trade demands it.

In giving the reader this view of the Springfield watch factory we cannot do better than commence with the machine shop. It contains a full set of lathes, planers, and presses, of the best known makers, and every tool needed in the construction of a watch. It is found manufactured on the premises. All the designs for tools are drawn here, and standards and gauges are prepared of holes, screws, and other regularities to facilitate the duplicating of work. Connected with this part of the concern is a well-supplied forge-shop for forging machinery and tools, and

hardening and tempering the steel parts of the watch. Besides this is a complete carpenter shop where all the patterns are made and all the wood-work of the institution is done. Indeed here is

AN INDEPENDENT MANUFACTURING CENTER, at whose multifarious branches centre upon the construction of the watch, he hides in a vest pocket. The material used in the construction of the Springfield company's watches is of the best quality of metal, steel, and whatever the different parts require. A representative of *The Times* in looking through this part of the establishment was struck by its completeness. His wonder was checked by an invitation to wait until he had seen the resources of the entire establishment, to do which he accepted an offer to follow him through the building. A rare and imposing sight it was to see the number of busy mechanics at their respective places, their attention concentrated on the work before them; to observe them guide the buzzing machinery and see the shreds of metal fly as the metal yielded to the keen and delicate tools applied to it. In the "plate room," into which the reporter was first conducted, a large amount of machinery is kept at work cutting, turning, tapping, and drilling the plates or frames of the watches. Great pains have been taken to procure the most

PERFECT HARDNESS AND ACCURACY in the fit of the parts, and the tools used are all the most elaborate. It is the opinion of the majority of it in the component parts depends upon the execution of the tools. To have a perfect watch requires perfect work. In the "piston room" are made the wheels and pistons. It is consequently a most important department. The use of various new machines, of an intricate description the best and finest quality of the material, and the skill of the workmen, by a series of revolving-cuts the wheels are fashioned and the teeth measured and cut. Here the most important details are the best material to work on and the utmost accuracy in the work, both of which are maintained, we venture to say, are combined with a scrutiny our readers cannot begin to conceive of. Most skillful workmen are necessarily employed in this department. Here the wheels and pistons are fitted into their plates, and the watch begins to take something like shape. It is now ready for the next department, which is the jewel-room, where all sorts of gems are used in the construction of the watch, on account of their hardness and durability, are shaped for use. The rough stone is here polished, cut, and drilled, fitted to the pivots on pistons, and fixed in their respective places in the plates. This is a very important department of the constructive work, and no one may well be believed to be spared to secure perfect mechanism. An imperfectly drilled hole or improperly polished surface would be numerous to the time-keeping quality of a watch.

THE NEXT DEPARTMENT is that of the escapement, where the pallet stones are made and fitted to the escapement. This work is attended to in the Springfield factory with the greatest care. The plan or form of the escapement used, which was originated in the factory, is among the recent discoveries in the art of watch-making which the founders of the business in this country have made. It is here, where and initiation is the highest compliment possible to work, and the best acknowledgment of merit. All the flat steel work and screws are made in this department, of sizes and patterns so exact and so perfect that a description would occupy an article in itself. Here another highly important novelty was exhibited to the reporter, in the manufacture of control pivots on the balance staff, which are used in all grades of watches manufactured by the Springfield factory. By its adoption a greater degree of accuracy is

STRENGTH AND DURABILITY is attained for the pivot, and improvement also comended universally.

The finishing department, which crowns all, is now reached. The various parts of the watch, now in order as perfect as human care and ingenuity can make them, are brought together in their native unadorned unutilized form. The watch is taken together, the springs are fitted, and the whole throbbing almost living, object is brought to accurate time and subjected to a thorough inspection, in order to correct any inaccuracies before the finishing touches are given. When it is discovered that the watch is perfect as regards time and workmanship, it is again taken to pieces. The plates and larger pieces are sent to the gliding room, where they are stoned, polished and gilded. The manner of gliding plates used by the Springfield company is almost unimproved. In the process the plates are not subjected, as they usually are in other factories, to a great heat. Heating the brass plates and the workmanship, it changes their form by warping, which is caused by expansion and contraction.

The process here employed is known as the "water" process, and the metal or metal is around its temper. The manufacturers are assured by long experience and by the acknowledgments of their patrons that their watches better than any other in the market.

In giving the reader this view of the Springfield watch factory we cannot do better than commence with the machine shop. It contains a full set of lathes, planers, and presses, of the best known makers, and every tool needed in the construction of a watch. It is found manufactured on the premises. All the designs for tools are drawn here, and standards and gauges are prepared of holes, screws, and other regularities to facilitate the duplicating of work. Connected with this part of the concern is a well-supplied forge-shop for forging machinery and tools, and

CHATELLER & SPENCE, Manufacturing Jewelers,

No. 652 BROADWAY, NEW YORK.

1129 Chestnut St., PHILADELPHIA, PA.

12 West Street, BOSTON, MASS.

120 Sutter Street, SAN FRANCISCO, CAL.

SMILLIE, DORRANCE & EDGE,

Manufacturing Jewelers,

No. 5 Maiden Lane, New York,

Manufacturers of Chain Bracelets,

Necklaces, Opera Chains, etc., from their New Woven

Fabric Chain, 14 and 18 kt. only.

POST, BEACH & DECKER,

No. 192 BROADWAY,

Manufacturers of Fine Jewelry,

BAND BRACELETS A SPECIALTY.

JOHN A. RILEY & CO.

Manufacturing Jewelers,

Nos. 7 & 9 Bond Street,

NEW YORK.

Eurasian Gold and Coral Sets—Roman Bracelets, Necklaces, &c.

ONYX Goods a Specialty.

D. VALENTINE,

No. 21 SOUTH SALINA STREET, SYRACUSE, N. Y.

Importer and Sole Agent in the United States for the

CELEBRATED WATCHES,

Manufactured by M. GROSSMAN, of Dresden,

Also a full line of the various styles and sizes of

WATCHES FROM PATEK, PHILIPPE & CO., of Geneva.

THE TRADE SUPPLIED AT LOWEST PRICES.

a watch is required to undergo a thermometer test, being exposed alternately to a low temperature, about freezing point, and an unreasonably high one of a hundred degrees and over. Adjustments and compensations are made for the variations which may be exhibited under the several conditions after which the movement is made.

VIOLENT EXTREMES OF TEMPERATURE will not affect the time-keeping qualities of the watch.

There are many points in the Springfield watch which are worthy of especial mention, such as the quality of the main-springs, the temper and elasticity, as well as the delicacy and finish, of the hair-spring, the intricate mathematical construction of the dial; the precision and scientific combination and application of the expansive balances all of which are made by the company with special adaptation to the different grades of watches. The entire simplicity and certainty of adjustment of the reversible screw-plate which is used in these watches is one of their most remarkable features, and their protection it gives the delicate organism against injury to the train by the breaking of the main-spring is an improvement of high rank and great value. The completed movement is encased by a closely-fitting band, simple in construction, which forms the most perfect dust-excluder in use.

These goods are rapidly growing in popularity and are highly spoken of by all dealers who have handled them.

Acid Coloring.

There are two processes for coloring, similar in purpose and effect: the oldest is called dry coloring, because the chemicals used are solids, namely, sulphate, nitrate and salt, but acid coloring has come into more general use on account of its being easier to manage and of the wider range of qualities of gold which can be submitted to the process. The purpose is simply to remove from the surface of the gold all alloy so as to leave a coating of pure gold of rich yellow color, which is very finely frosted, to obtain which, with perfect equality, it is necessary to have the surface smooth, then anneal and boil out in pickle made of nitric acid and water—lastly, annealing black before dipping in the color. A good formula for coloring mixture, saltpetre 9oz. 12dwts; salt 4z. 16dwts; muriatic acid 6oz. The effect on the article is necessarily to reduce the weight, therefore the quicker it is done the better, and if the gold be properly alloyed 14 minute is sufficient time to expose them to the action of the mixture, which must boil up till it fills a No. 10 black lead crucible. In all acid colored work there is between the body of gold and the outside color a brown coat of partially colored material, and if the work is left too long in the mixture the coat is much thickened, and the fine color may be easily peeled off, especially if the gold be too low in quality. The finest color and best surface may be obtained on about 15k. gold, but the range is from 12 to 20k, and to be successful the operator needs considerable practice. Before using a crucible it is necessary to have it well annealed, as accidents are thereby avoided. To prevent change in the color of goods, after coloring, it is well to wash them in ammonia, which will neutralize any salts that remains in the somewhat porous surface, and if the articles are scratch-brushed, which slightly brightens them, they are less liable to soil. It is best not to give the ammonia bath till after brushing, following with a good wash in hot water and drying in hot saw-dust. H. O. M.

"Taking Advantage of the Situation."



Size 13x17 inches. Printed in 13x11 colors.

The above Picture called "Taking Advantage of the Situation," tells its own story.

From the day it was adopted and placed in my window I have had a crowd of people constantly looking at it, and I do not hesitate to say that nothing in the advertising way has ever done me as much good as this has.

What we want to do is to attract attention, the true Barnum idea of business, and the thing that will do it is the quickest, cheapest, and best, is what we all want and need. You will find that one of these pictures, handsomely framed, and placed in your window, will attract more attention than anything you ever had.

Part of the first edition were sold at \$3.00 each and they were then reduced to \$2.00 at which price several hundred have been sold, and orders have been filled from many of the principal jewelry stores in the larger cities for from fifty to one hundred at a time, and from smaller towns for a dozen or more at a time.

Placed in hotels and other public places they are certain to attract more attention and do more good than ten times their cost spent in ordinary advertising, besides having the great advantage of being a permanent advertisement.

My own business has in these very dull times increased every month several hundred dollars over the corresponding months of last year, and I can credit it to nothing else than the circulation of this unique picture.

In order to extend the sale of them I have adopted the following plan: Having a pair of diamonds weighing, weighing over 20 carats, we cost to import about \$4000 in gold, I propose selling 4000 carats at \$2.00 each, and give these diamonds away to the 4000 purchasers of the chromos. As I cannot legally sell numbered tickets, I have entered in a book numbers from 1 to 4,000, and on the receipt of each name with \$2.00 it will be entered as they arrive, and a postal card will be mailed to each one with their number on my book. When all are sold I will place the diamonds in the hands of D. H. HOPKINSON, Esq., Editor of the JEWELERS' CIRCULAR, and he has kindly consented to call together a large committee in some public Hall, and they will decide in what manner the ownership of the diamonds shall be determined.

Whether I will carry out this matter in honor is the main question with every one who sends me \$2.00, and that I will do so I think no one will doubt who reads the following:

NEW YORK, Oct. 1st, 1878.
We, the undersigned, having known Mr. J. H. JOHNSON for the last fifteen or twenty years, have no hesitancy in saying that we believe that any matter of business undertaken by him will be carried out to the letter, and that any statement made by him may be implicitly relied upon.

Brainard, Steele & Co., 9 Maiden Lane.
Carter, Hawkins & Son, 1 Bond Street.
Dodd & Hedges, 9 Maiden Lane.
Graham Manufacturing Co., 1 Bond Street.
Merrill Silver Plate Co., (C. Cooper, Pres.)
Smith & Hedges, 1 Maiden Lane.
Vulcanite Jewelry Co. (Jas V. Shoemaker), 191 Broadway.
Whiting Mfg Co. (C. E. Buckley, Pres't), 181 Broadway.
Wheeler, Parsons & Hayes, 3 Maiden Lane.

And I do not hesitate to refer you to any one else in the trade here in New York, by the most of whom I am well and favorably known.

By sending 50 cents extra I will print your name and address on the availing of the picture, and for 25 cents additional it will be sent mounted ready for framing, and if you will order ten or more they will all be sent mounted with your name and address on them, free of cost.

Having sold a large number of these chromos before such general publicity was given to the trade, it is confidently expected that the whole 4,000 will be disposed of within a month, when the result will be immediately made known through the columns of the JEWELERS' CIRCULAR.

JOHN H. JOHNSON,
No. 150 BOWERY, N. Y.

Dealers who are not as yet subscribers to this journal, on remitting to this office \$3.00 will be entitled to the above picture and a copy of the JEWELERS' CIRCULAR mailed regularly each issue for the term of one year from date of subscription, and will participate in the above plan offered by Mr. Johnson.

D. H. HOPKINSON,
No. 269 Pearl street, N. Y.

MILLER BRO'S MANUFACTURING JEWELERS,

11 MAIDEN LANE, New York.

INITIAL GOODS A SPECIALTY!



Locketts, Sleeve Buttons, Studs,
Collar and Chemise Buttons,
Embossed, Plain, Engraved and Roman Gold.

Manufactory, 47, 49 & 51 Franklin Street,
JAMES W. MILLER, NEWARK, N. J. ISAAC M. MILLER.

DENNISON & CO.

MANUFACTURERS OF

Jewelers' Findings

Consisting of PAPER BOXES of Every Description,

JEWELERS' CARDS, MERCHANDISE TAGS, CHAMOIS SKINS,
TISSUE PAPERS, PINK & WHITE CORRONS, (Sheets & Bags), TWINES, &c.

202 BROADWAY, NEW YORK.

5 Suffolk Place, Boston, Mass.

632 Chestnut St. Philadelphia.

150 South Clark St. Chicago.

159 Vine Street, Cincinnati.

110 Pine Street, St. Louis.

INTERNATIONAL WATCH CO.

Of New York.

Ladies' and Gents' Hunting & Open Face KEY AND STEM-WINDING MOVEMENTS.

It is our system of combining the cheap labor and skilled artisans of Europe with American machinery, which enables us to obtain for the INTERNATIONAL WATCHES their high and hitherto unattainable standard of perfection in conjunction with EXTREME LOW COST of manufacture.

SCHWOB BROS. & CO.,
GENERAL AGENTS.

P. O. Box 2310, No. 173 BROADWAY,
NEW YORK.


REED & BARTON

 MANUFACTURERS OF
 FINE ELECTRO-PLATED

Table Ware

OF EVERY DESCRIPTION.

Would call especial attention to their new

Patent China-Lined Ice Pitchers.

Factories, TAUNTON, MASS.

These Pitchers are made of the finest quality of white metal, heavily plated with silver. They are finely engraved and chased in a great variety of decorations. The linings are of fine stone china. The top is secured to the body of the Pitcher in such a manner that can be easily detached and the lining removed for cleaning or other purposes. Many improvements attained are noticeable in these Pitchers. Water and ice standing in them do not come in contact with any metal whatever. They are perfectly clean, and easily kept so. They are perfectly free from all odor or taste. Lemonade, beer, milk, etc., may be kept cool in and drank from these Pitchers without endangering health. There can be nothing cleaner or purer for holding liquids than pure, white china. There is no possibility of leakage. The construction of the Pitcher is such that the linings can easily be replaced at a very small cost.

Salesroom, No. 2 MAIDEN LANE, NEW YORK.
The American Sterling Company


NAUBURG, CONN., NEAR HARTFORD.

**Manufacturers of Silver-Plated Spoons, Forks,
 AND A GENERAL LINE OF PLAT WARE.**

The base used is AMERICAN STERLING METAL, of our own manufacture, which contains 20 per cent. of nickel, and being made by a process which renders it harder and tougher than ordinary 18 per cent. nickel silver, it is the best base now in use for plating. Our goods are plated with full weight of silver, and carefully weighed before and after plating, and the amount of silver guaranteed as represented, and the goods warranted in every respect.

Office, Nos. 1 & 3 DEY STREET, N. Y.
JOHN COOK,

MANUFACTURER OF



CENTENNIAL PATTERN.

Silver Tea Sets, Pitchers,

WAITERS, CUPS,

Goblets, Spoons, Forks, Knives, &c.

No. 6 LIBERTY PLACE, near Maiden Lane, NEW YORK

SEND FOR PRICE LIST.

Established 1857.

WATERBURY CLOCK CO.

DEALERS IN EVERY DESCRIPTION OF

Clocks and Clock Materials,
No. 4 Courtlandt Street, New York.
No. 160 Clark Street, Chicago.

MANUFACTORY, WATERBURY, CONN.

M. BAILEY, Treas.

Illustrated Catalogues and Price Lists forwarded on Application.


Simpson, Hall, Miller & Co.

MANUFACTURERS OF

Fine Silver-Plated Wares,

 For Table and Ornamental use, and articles unique
 for Presentation,

Wallingford, Conn.
**Sales Room, 676 BROADWAY,
 NEW YORK,**

 WHERE DEALERS visiting the city are invited to call and examine our wares
 which will be found of every variety and style known to the trade.

 WHEN ORDERS are sent by Mail time will be saved by sending them direct to
 the Factory at Wallingford from whence all goods are shipped.

E. T. COOKE, Pres't.

R. STRICKLAND, Treas.

J. W. COOKE, Sec'y.

R. STRICKLAND & CO.

MANUFACTURERS OF

Fine Silver Plated Goods
Salesroom, 516 & 518 BROADWAY,
ALBANY, N. Y.

Catalogues and Price Lists furnished on application by mail.

WILLIAM BALL.

THOMAS BARNARD.

BALL & BARNARD,

MANUFACTURERS OF

FINE GOLD, ENAMELED & COLORED


BRACELETS,
Office, No. 9 JOHN STREET,

Factory, 30 Franklin Street, Newark, N. J.

NEW YORK.
PRIEST, FULLER & LAWRENCE,

Importers and Dealers in

**WATCHES, DIAMONDS,
 Jewelry and Gold Chains,**
No. 15 MAIDEN LANE, NEW YORK.

Sole Agents for

CHAS. WUILLEUMIER,
 Chaux-de-Fonds, Switzerland.

PAUL LAVAL,
 St. Imier

E. A. PRIEST.

F. A. FULLER, Jr.

I. S. LAWRENCE.

Archer & Pancoast M'f'g Co.

DESIGNERS AND MANUFACTURERS OF BRONZE, CRYSTAL & GILT

GAS FIXTURES,

No. 67 Greene Street, and 68, 70 & 72 Wooster Street, New York.

ARE NOW MAKING A SUPERIOR LINE OF

ARTISTIC BRONZES,

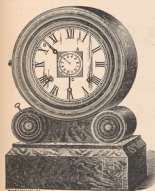
COMPRISING STATUETTES IN PAIRS—CARD RECEIVERS—CARD TABLES—VASES—BUSTS—PAPER WEIGHTS—BIRDS, &c.—ESPECIALLY SUITED FOR THE HOLIDAY TRADE.

Fully Equal in Finish to the Imported and at LOWER PRICES.

Photographs and Net Wholesale Price List will be furnished to Jewelers on application.



REST FENNER SMITH & CO.
Manufacturers and Importers of
Walking Canes,
Rich Gold and Silver Heads,
A SPECIALTY,
543 BROADWAY,
NEW YORK.



SHIVE'S PATENT WATCHMAN'S CLOCK.

The Simplest, Best and Cheapest!
Watchdog of the Watchman

MADE.

RETAIL PRICE ONLY \$15.

Also guaranteed a first-class Time Keeper.

SHIVE GOVERNOR CO.
BETHLEHEM, PA.

Also MANUFACTURERS OF
Shive's Patent Steam Engine Governor

Warranted the best in the world, and
BUOY'S PATENT COUNTER SCALES
The newest and most convenient in the market.
ALL CIRCULARS MAILED FREE.



SAMUEL C. JACKSON,
Manufacturer of NEWEST STYLES
BOXES AND TRAYS
FOR SILVERWARE, WATCHES, JEWELRY, &c.
Office & Manufactory, 180 BROADWAY, N. Y.
Price List sent only with samples.

Grand Headquarters!

ESTABLISHED 1850.

M. J. Paillard & Co.

MANUFACTURERS & IMPORTERS OF ALL KINDS OF

Musical Boxes

OF STANDARD REPUTATION.



—AND—

Fancy Musical Goods,

Specially designed for the requirements of this market.

DECIDED IMPROVEMENTS.

(PATENTED.)

M. J. PAILLARD & Co.'s INTERCHANGEABLE AND SELF-ADJUSTING CYLINDERS for increasing the number of airs and rendering the instrument capable of many changes in tunes and melodies (with but a slight additional expense.) This invention is a marvel of mechanical ingenuity, and has achieved a wide spread reputation.

THE NEWEST FEATURE

is the GRADUATING SCALE, an improvement recently introduced and patented by us. This invention consists in combing the cylinder with two or more segments of combs of graduating notes, the vibration of which are of similar pitch, producing a clear and distinct harmony of sound never before attained in the old style of boxes.

Our Repair Department.

Skilled workmen, specially educated in intricate repairing, are employed in our establishment, and all damaged or injured instruments intrusted to us for repairs will be put in workmanship like order at a moderate charge.

Buyers coming to New York are invited to examine our stock—the largest in the city.

M. J. Paillard & Co.,

No. 680 BROADWAY, NEW YORK.

SPRING TRADE, 1875.

AIKIN, LAMBERT & CO.,

No. 12 MAIDEN LANE, NEW YORK.

**Choice
Gold Pens.**

Have in stock, and are manufacturing a large assortment of first-class Gold Pens, consisting of long nibs, short nibs, fine pointed, coarse pointed and angular or oblique pens. All of which will be furnished with soft, springy, or hard temper as may be required.

**Assortments
in
Show Cases.**

Assortments arranged in handsome trays, and pen signs furnished to regular agents. Being disposed to meet liberality with liberality we have originated and gotten up Metal Show Cases of sizes suitable to the wants of our patrons who order sufficient goods to make a creditable display. Others are compelled now to follow our lead, acknowledging us as "Leaders of Fashion."

Rich Jewelry.

We are also manufacturers and dealers in solid gold and rolled plate jewelry all of which being intended for the Jewelry Trade, proper will be found reliable.

Rings.

Diamond, Amethyst, Topaz, Pearl and Stone Cameo Rings.

Chased, Engraved and plain Band Rings.

Solid 18kt. and 14kt. plain Rings.

Filled Rings of all new styles.

Vest, guard, and other styles of Gold Chains.

Gold Sets, Pins, Cuff Buttons, Studs, Ladies' and Gents' Jewelry.

New goods sent on selection when required.

Chains.**Paul Breton**

Perfect.

Reliable.

Excellent.

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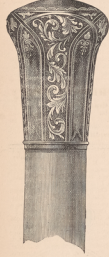
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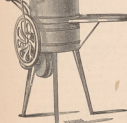
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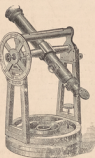
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We have received letters from our own customers inquiring how it is that such discounts are quoted on our goods by people who do not make them, while the manufacturers' rate is higher.

To such inquiries this notice is intended as a reply, and also to put the Trade on their guard against imposition.

These bogus goods are greatly inferior to the genuine, and in many cases are only thinly plated on BRASS, and therefore must seriously react upon whoever deals in them.

To obtain reliable goods specify in your orders that you want the "ROGERS & BRO, Waterbury" goods. If your jobber attempts to palm off any other upon you return them and order direct from the manufacturers.

ROGERS & BRO.

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203 BROADWAY, N. Y. | October 1st, 1875.

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AND

A MONTHLY HOROLOGICAL REVIEW

JOURNAL

DEVOTED EXCLUSIVELY TO THE INTERESTS OF THE WATCH, CLOCK, JEWELRY AND KINDRED BRANCHES OF INDUSTRY.

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Vol. VI.—No. 10.

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NEW YORK

Selections from Saunder's Traite d'Horlogerie.

Translated for the Jewelers' Circular and Horological Review by Joseph Y. Rogers.

ADDITIONAL OF AUXILIARY COMPENSATION.
To avoid the irregularity attending extreme temperatures many contrivances have been devised, and all the various devices may be divided into two classes, as follows:

In the one, bi-metallic plates are arranged on the balance so as to produce at extreme temperatures, and when it is required, a shortening or lengthening of the radius of the balance.

In the other plan movable pieces are carried outward and inward while in contact with the arms of the balance.

These contrivances necessarily complicate the balance, and if they are imperfect, contribute to the defects of the balance. Moreover, it has long been known that contacts and pressures, which are not rendered changeable by friction, do not afford great security for such a delicate effect as is required in the compensation of a balance.

Many secondary compensations of other constructions have been tried up to this date; indeed, they defy description. Some of them, notwithstanding, are really interesting, and above all we shall mention the combination due to a very skillful chronometer maker, M. Vésiere.

COMMON COMPENSATION BALANCE, FURNISHED WITH ADDITIONAL COMPENSATION, By M. Vésiere, French and Foreign Patent.

This balance has been called by the inventor: Balance with compensation balance and bi-metallic plates.



A.—Common compensation balance.

J.—A movable piece placed upon the balance, having a screw on to fix it.

B, C, D.—Circular bi-metallic plates with an arm *AE*; it is cut in *G*.

F.—Screw bored, internally, intended to fix the plate *B, C, D* upon the movable piece *A*.

H.—Mass placed upon the plate near the center and fixed by a screw *L*. It has in the center a screw *Y* to modify its weight.

K.—A screw to balance the system.

L.—Auxiliary mass placed upon the circumference of the balance, the weight of which placed in relation to the mass *H* determines the amount of the compensation.

M. Vésiere's Note.—"An additional compensation must not only produce equal running in extreme and medium temperatures, but has also to keep the uniformity of that running by passing through the intermediary temperatures, and reach further limits than 0° to 30°, where they use to stop."

"The mass with a bi-metallic plate *B, C, D*, is capable of producing this effect. It is made of steel in the inside and brass on the outside.

"This mass *H* is placed upon the projection of the balance's radius, passing through the center of the plate *B, C, D* at a temperature of +15°. If this temperature rises or decreases the mass *H*, owing to the expansion of the plate *B, C, D*, yields from one side to the other of the radius by following on the circumference of the plate, but as this circumference is not concentric to the balance the result is that the mass *H* comes near the centre,

(at the right or left side of the radius) and hastens the work of compensation. This haste will increase when the mass moves further from its normal position.

"A compensation may be obtained in the limits of a second by a change of 50°." "Though I have not tried beyond that limit, I think we could do so very easily."

NATURAL ACCELERATION OF CHRONOMETERS WITH THE WEATHER.

Good chronometers generally and gradually at the end of two or three years, attain an acceleration in their rate of from four to five seconds in a day. According to Dent this advance is due to some combination of the oxygen of the atmosphere with the hair-spring, which has the effect of increasing the strength of the hair-spring.

M. H. Robert points as the main cause of this acceleration to the different resistance of the oils at the pivots of the escapement wheel and the balance.

M. Jacob explains the fact in this way: Chronometers are often and longer under the influence of heat than of cold, and the balance being then in a state of contraction, the result is that the bi-metallic plates alter a long time never come exactly to the same position, and as a consequence the chronometer advances or accelerates.

M. Villareux explains the fact by the action of the escapement, and the impulse or impelling force take place before the balance arrives at its position of equilibrium.

M. MONTGOMERY EFFECT OF A BALANCE.

M. Montgomerie, a modern watchmaker, has tried to discover if between the largest and the smallest of the amplitudes described by a balance, there was one in which the work of the balance was maximum.

He has found after gradually increasing the motive force of a chronometer in such a way that an oscillation of 135° at first, was risen to 490°, that the maximum of effect was between 340° and 307° of amplitude.

RESECTION OF A COMPENSATION BALANCE.
We have to cut from a plate of steel, carefully prepared, a disc a little larger and thicker than the balance requires to be when finished. Some manufacturers use worn-out files, for instance those of the mark of *Stude*. As the steel is enough annealed when the brass is melted on to it, it is not necessary to anneal it again.

The disc is bored in the center on the straight boring machine, so as to have a hole with a diameter equal to the thickness of the balance staff. The hole is made as smooth as possible, and the discounter is been made perfectly flat in one of its faces and upon a plain roller is fixed with shell-lac on a movable roller. This roller has in its center a very short arbor, about the length of the thickness of the steel. Experience only can make easy this operation.

The disc is squarely turned so as to be the same of the balance less the amount of brass necessary. (Medium between two-thirds and three-fifths of the total thickness.)

Then the hole in the disc is covered. Some use for this a slate stone, well turned and closely fixed to the hole, a little flattened at its surface. Some a steel stone perfectly polished. One manufacturer recommends to have it rubbed with an onion, when a little crust will be formed on the surface, which will prevent any adherence. Most all the manufacturers choose the oil matter on the stone used to sharpen gravers, etc. The hole must be hermetically covered, for if a little brass should pass through, the hole would be soldered.

The disc is placed in a cradle four to five centimeters long by two to four deep, the side adapted to the roller being at the bottom of the cradle, and is clad with good brass in a proportion changeable with the size of the balance between ten and thirty grammes; then the whole is recovered with borax finely ground.

The steel where the brass ring is to be soldered must not be touched with the fingers, as the perfect adhesion of the brass to the steel is then more difficult.

The crucible is placed in the mouth of a cupel furnace, the temperature of which

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has to be already re-hot. After a few moments the metal commences to melt. The crucible is shaken or the liquid metal is agitated with an iron bar so as to have the extraneous matters come to the surface. We know that the fusion is complete when the zinc vapors commence to appear distinctly. The crucible is removed, and then with the iron bar we sink to the bottom the steel which is at the surface and we let it remain there time enough to get solid to a certain degree.

The face nearest to the bottom of the crucible is not much covered with brass. With the file we remove the brass from the face and a little of that covers the edge, leaving only a brass ring of about two to three millimeters.

This once done the hole must be uncovered, and if all the proceedings have been carefully conducted the hole is perfectly clear, and has only to be polished with oil-stone dust.

The brass is then carefully turned, leaving a little more than the required thickness, the exact thickness being carefully obtained by our manufacturers after carefully hardening the brass.

The residuum of brass is removed and the steel turned true with the graver. Once at the convenient point it is finished with always perfectly sharpened; it has to cut the metal and to draw the steel along.

The inside and the face of the rim is rubbed with fine emery and a smooth square surface is easily obtained.

Then, having cut the free of shank the screw-holes are bored on a dividing machine. These holes, twenty or thirty in number (when the balance has screws and no masses) are usually in succession in the progression every time nearer toward the end of the plate. The finer the holes are the better. The best method is to bore the holes upon a machine constructed for the purpose.

Then the crossing is made; the two small bars must be exactly identical and regular, so as the differences of its weight will not disturb the equilibrium of the balance. This operation requires great care and delicacy, because no part of the inside of the rim must be touched with the file.

To make it smooth we use the iron polisher and oil-stone dust. The compensation masses are made as follows: The cut pieces, disposed like a circular saw of the same diameter and thickness as the bi-metallic plate) in a strong brass plate in which the masses are afterwards made.

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The masses and the screws once finished, the rims are cut with a single cut on the turning machine. It is safe to put them into wax during the operation. It is good to put the balance in boiled oil. If not then cleaned, the screws and masses are adapted to rotate upon an axis, and placed in perfect equilibrium with the pivots, and is then ready to be regulated.

Practical Hints on Watch Repairing.

By ENCKELBERG.—No. 8.

(122) A number of different methods have been proposed for isochronizing a hair-spring, of which some are good, some not so good, and some good for nothing. We will consider the most important ones.

The first method is based upon the theory mentioned in section (112), that isochronism depends on the spring being of a certain length in proportion to its strength, and the practical application of it consists in trying the spring piece at different places, till the isochronal point is found, after which the watch is brought to time in some way without changing the length of the spring. The method, which is substantially a mere feeling around after the isochronal point, is further considered in

section (124), which tells us where to commence feeling, so as to find the right spot as quickly as possible.

(123) Another method was practiced by Ferdinand Berthoud and others, and consisted in tapering the spring at the end, either by file or oil-stones, and is equally well backed up by good authority. But it is evident that the operation must be a hazardous one at best, not workmanlike, nor is it possible to lessen the thickness of the spring in true proportion by such means. Moreover, the thinning is done before the spring is wound into shape, so that the whole is a mere matter of guess-work, as to the correct taper, and the correct length of the tapered portion from the end. Lastly, a spring tapered at the end, in any manner, according to my observations and ideas, is ruined for all fine time-keeping. As the process is mechanically impracticable and worthless, I shall not dwell upon the philosophy of the manner in which the tapering is claimed to secure isochronism, or the details of its execution.

(124) A third method, by what is called the isochronous stud, applicable to the flat spiral spring, is that, instead of the stud to which the outer end of the spring is pinned being fixed to the balance bridge or plate as usual, it is carried at the end of a short, straight, supple-spiral spring, attached at a tangent to the coils, &c., the longitudinal direction of this spring is at right angles to a line drawn from the stud to the centre of the hair-spring. This short spring is fixed to a bar secured on the balance bridge. This method is not adopted in practice, being objectionable from the difficulty of proper execution, want of stability and other reasons. It secures the very important advantage of allowing the outer end of the spiral spring which is fixed in the stud to move towards and from the center of the hair-spring as the coils enlarge or diminish, and obviates the side pressure resulting from the usual rigid attachment of the stud; but this advantage can be obtained by the use of the following device. I will therefore omit details of method of testing and adjusting the proper length and stiffness of the supplemental spring, position of the stud, &c.

(125) A fourth method is by opening or closing together the pins of the regulator, and is an attempt to secure the same results of changing the stiffness of the hairspring as the action of the regulator. It is mainly applicable to the ordinary flat spiral springs. In this method the stiffness of the spring is affected by its contact with the pins; the action of the spring before stiffening takes place while it remains free between the pins and is virtually without any control entirely up to the hand. The idea is that the longer it remains thus free the slower the vibrations will be, while the earlier in the vibration the pins come into contact with the spring and the less the vibration will be.

Of course, this effect is produced in both the long and short vibrations, but it is greater in the latter, because the difference produced by opening or closing the pins is in a greater proportion to a short one than to a long one. Hence, if the watch loses in the short vibrations, it shows that the stiffening of the spring does not commence early enough, consequently the regulator pins are too wide and must be brought closer together. If it gains in the short vibrations, it begins to stiffen too soon and compels the vibrating to be quick. The pins must therefore be opened a little, which increases the length of the slow part of the vibration before the stiffening commences, and consequently shortens that part of it in which it is stiffened and hurried up by the contact with the pins.

(126) At first thought, this appears to be all that could be desired, being easy, quick, and apparently meets all the conditions of isochronism. But the objection is that the regulator has its own office to perform in the mechanism of the watch, and for its perfect performance it must be made in a certain manner. Among other things, the pins should be as closely together as possible, while avoiding any binding upon the spring when its position is shifted (68.) Therefore we should not

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permit any material departure from the form which will best preserve its true functional character for the sake of accomplishing some other end. But this method is well adapted for all classes of fine clocks, both American and imported, and whether having lever or cylinder escapements. For watches it is not well adapted, except those in which there are but few coils of the hair-spring and they are wide apart, to which more room is usually given in the regulator as will be noticed in a large share of English lever and duplex watches.

(127) The cylinder escapements may also be advantageously isochronized in this way, as their low price generally precludes the employment of the more expensive methods. And it must be admitted that a well made cylinder or duplex watch, particularly when provided with the fusee and chain, may be adjusted very closely by this method. For this purpose the regulator pins are placed further apart than stated in (126), when fitting the spring, so as to allow of either opening or closing them a little, as might be required by the adjustment.

(128) But in fine watches, its use, if allowed at all, should be restricted to the finishing touches, which would require only the very slightest alterations of the pins, which, in this case, I should advise to be placed at the proper distance apart at the start, (88), and only change them by opening them very slightly. Should a wider opening be required, or if it may be adjusted very closely, the pins a little closer together, (which, of course, could not be done,) the hair-spring should be moved in the stud, according to section (126). In all cases when the adjustment is completed the two pins should be left parallel, not inclining toward each other, so that, if the spring should play between them at a higher or lower level, it would still find the same width of opening.

(129) Fifthly, we may change the action of a spring by making its coils closer and more numerous, or more open and lower in number, still retaining the same length of wire in each. The former can only be done, generally, in making a spring—as by rewinding it after being made—the coils are apt to be unevenly compressed. But the opening of the coils can be safely done as shown in section (29). The philosophy of the operation may be stated thus: We know that if a spring in its inflexion from the point of rest to the extent of the largest vibration increases its strength or relative force in too rapid a ratio, it will gain in the long arc and lose in the short ones, and vice versa. Now it is evident that, if a spring has five coils, giving the balance one turn will produce a greater displacement and compression of the coils than would occur if it had ten coils, and vice versa. Hence if it requires greater force in moving from the point of rest in the former case than in the latter, that force must have augmented in a more rapid ratio.

(130) From this we deduce the practical lesson that when the spring gains in the long vibrations, or its force augments too rapidly a ratio, the coils should be made smaller and more numerous. When it loses in the long arcs and its force augments too slowly, we should open the coils a little. But, although the principle is correct, it is practically available only within very narrow limits, and when no other method can be adopted, or another spring cannot be obtained. But it is incomparably preferable to the practice of grinding or dipping into acid throughout its entire length to weaken it, the worse practice of dipping it for only a portion of its length, or the unscientific butchery of "sawing" the outer coil.

(131) Sixtiethly, in exceptional cases we may improve the isochronism by changing the diameter of the hair-spring coil, when it is not suitable for the spring, or when the spring itself is defective in shape. Rather than too large an open space in the center of the spiral, (88), and the spring diverging too boldly from the collet to meet the spiral, (89), it is better to make a larger coil, which will enable the spiral to come nearer to the collet. But the moderate size should be adhered to—neither much larger or smaller than the proper proportion for the size and weight of the

balance to which it belongs. A too large coil will be indicated (if all other conditions are correct), by the watch gaining in the long arcs and losing in the short ones. If the coil is too small, the spring will have too little leverage or power over the long vibrations and gain in the short ones.

(132) It must be remembered that, by these words "gain" and "lose," in this connection, it is not meant that the watch both gains in the long arcs and loses in the short ones, or the reverse, but simply that, on comparing times, we find that the long vibrations are the quicker and the short ones the slower of the two, or the reverse, as the case may be. It will not be necessary or advisable to change the size of the collet, except for the purpose of filling up the open space at the center and improving the shape of the inner end of the spring without fitting a new one, or where a terminal curve is not fastened to the collet at the proper distance from the center, $\frac{1}{4}$ in., half the radius of the spring. In such case the bar of the collet must be changed, or a new and correct one made. The stud, also, should be changed if it does not describe the spring in conformity to the above rule for the distance from the center.

(133) Seventiethly, it is possible to vary the isochronism by changing the weight of the specific gravity of the screws in the rim of the balance—for instance, by substituting screws of brass, gold or platinum for those of steel. The user of these screws, or by changing the weight or diameter of the balance; or in any way changing the relative force of the spring as connected with that balance. But as no rule can be given for these alterations, which must be made by mere blind guess-work, it is not worth while to discuss here the theory or practice of this method.

(134) In the duplex and cylinder escapements we may vary the isochronism by varying the relative amounts of the escapement-friction and the arcs of vibration. For instance, if the escapement be changed so as to transmit the motive force more advantageously, and increase the impulse-power, without changing the friction upon the roller or cylinder, the arcs of vibration will be increased and the long arcs will be slower than the short ones. (So, in general, any alteration which increases the arcs without changing the escapement-friction, will make the long arcs slower than the short ones.) But increasing the friction without increasing the impulse-power, will make the long arcs quicker. So, in general, any change which lessens the effective impulse-power, without lessening the escapement-friction, will make the long arcs quicker than the short ones. But this method is of no great practical importance, because it is, of course, not advisable to make the escapement "worse off" in order to improve the isochronism; and on the other hand, the escapement should be in as good order as we can get it, before we undertake to isochronize the spring. The latter is very much left for our alterations, except by increasing or diminishing the strength of the mainspring, which, also, should be done with great caution, for there is a correct proportion between the motive force of the mainspring and the weight and diameter of the balance, which should not be greatly departed from. But the above remarks will show how incorrect is the idea that isochronism can depend upon the hair-spring alone.

(135) Finally, we have, for isochronism, the hair-spring spiral, a method which consists in bringing the two ends of the spring, or "points d'attache," as they are called, to the same vertical line. This is in accordance with the philosophy of the method, because any method which proposes to make a spring isochronal by means of any fixed manner of treatment whatever, except by actual adjustment of it to the watch to which it belongs, cannot be correct. If the spring alone was concerned it might be possible to isochronize it by a certain invariable manner of treating the coils. But this is not the case.

(135) With any given hairspring, the



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isochronal point would require to be at different places in it, depending upon the construction of the balance, the escape, etc.,—even changing the size of the coils will cause the isochronal point to vary its position. The most that any watchmaker can do is to enable us to approximate to the isochronal point, leaving the corrections to be done by means of testing and adjusting. And, although I have examined a great many fine-tuning watches for that purpose, I have not yet found one where the spring was pinned exactly according to this theory,—the nearest always being a little on one side or the other. Nor have I succeeded in closely isochronizing a spring according to this theory, without resorting to the regulator pins (125) to enable me to complete the adjustment without changing the *points d'attache* of the springs. But as this mode of pinning enables the workman to fit his spring with tolerable accuracy attended with scarcely any extra labor, it should be generally followed, even when the spring is not intended to be isochronized, as I have already recommended (34, 48). Even a low forced coil should always be done in this way, as can be afforded. This method will at least guide us to an eligible starting point, or, near which we may reasonably expect the spring to be isochronous.

(136) The process of fitting and isochronizing a flat spiral spring is as follows: First proceed as already directed in sections 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

(136) The process of fitting and isochronizing a flat spiral spring is as follows: First proceed as already directed in sections 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

(137) Mark down on a piece of paper the relative positions of the two *points d'attache* (or the point pinned to the collet, and the point held in the clamps, while the spring gives the isochronal vibrations), with reference to the center of the spring. Now the problem is to alter the length of the spring till it will give correct time, and yet leave these *points d'attache* in the same relative position, or nearly so. For example, if these two points are in the same radial line, *i. e.*, a straight line drawn from the center of the spring to the outside passes through both points, but the marked correct-time point (130) is a quarter of a coil nearer the end, we let out the spring (in the clamps) a quarter of a coil at the outside and break off enough at the center to bring the two new *points d'attache* in the same radial line as before, when the spring will both be isochronal and give correct time. In practice it will be necessary to let out the spring a little more than the quarter of a coil, in order to compensate for the amount broken off at the center. In other words, we are to alter the spring at the center so that, when *flexions* (or the point pinned to the collet) shall be in line with the points in the outer coil which gives correct time in the clamps.

(138) But when the correct-time point of the isochronal point is not in the radial line, as above supposed, we must proceed a little differently at the start. For if we should take up the spring to the former point, we could not then bring the *points d'attache* in the same radial line as before, and the spring will both be isochronal and give correct time. We can not let it out at all,—or, at any rate, but very little. We are therefore obliged before following the course just outlined to break enough off the center to take us on the other half of the inner coil, which will enable us to bring the *points d'attache* into line as in the last paragraph of section (137), after allowing at the outside as much additional length of spring as we have had to take off at the center in our case, so as to avoid changing the balance by a difference in the total length of the spring. A quarter or half coil at the

center will have but little effect on the rate, but a great effect on the isochronism. In these found, we should begin in mind that, inasmuch as every coil may be isochronized, we may find an isochronal point in either direction from the correct-time point, in different cases, and we should choose the one which is nearest to the correct time-point and requires the least alteration of the spring. Therefore, if breaking out the center, as just spoken of, would be objectional in any case (as, in), and we could find another isochronal point on the other side of the correct-time point and not so distant from it as the former, we either choose the latter and so avoid a portion of the objectional alteration. Having by our manipulations caused the isochronal and correct-time points to coincide, nearly so, we finally test for the isochronal point, pin the spring properly to the stud at that point, and correct the rate of the watch by the regulator.

(139) When the two *points d'attache* are not in a radial line, as has been thus far supposed to be the case, their real position should always be done in the center, and the spring then altered as already directed till it gives correct time and the *points d'attache* are in the same radial line, again. It is advisable to first make all changes on paper, to see how they will come out, before actually breaking or altering the spring. In the present case draw an outline of the spring, make a dot at the center, then draw one line from the center through the point pinned at the collet and another to the point held in the clamps when giving isochronal vibrations. Suppose that the two lines are 45° or one-eighth of a circle or coil apart. Now our task is to bring the point pinned in the collet into the same relative position to the correct-time point as it now has to the isochronal point, *i. e.*, 45° from it; when, if the amount of spring broken off has been properly allowed for, it will both keep correct time and be isochronal. By proper care in the first pinning of the spring to the collet, and using pencil and paper freely, as just described, we shall never have to break out the center much, if any. For if we find a certain spring is likely to be suitable to our balance, we should cut the center no more than barely enough to fit the collet properly (38), and then, if we have to take out a little more, it will not leave open space enough at the center to do any harm.

(140) It is well to state, however, that we are not obliged to invariably bring the isochronal and correct-time points of the spring together, as previously directed. For it is optional with us to do that, or at once pin the spring to the stud at its isochronal point, when found, and omit the causing of the points to coincide, but bring the watch to time by the regulator or balance. (See article on regulating, hereafter.) This will often be the quickest and easiest way to do, and is unobjectional when the rate at the isochronal point is very nearly correct, *i. e.*, the isochronal and correct-time points are not very far apart. When this course is followed, the process is to select the spring as directed in articles Nos. 3, 4 and 6, fasten it at the collet in accordance with section (38), and the isochronal point, pin to the stud at that point, then bring to time in the just stated manner, without disturbing the central coil after the first pinning. The foregoing directions for isochronizing the flat spiral are entirely different from any before published, and it is believed, correct in all cases. We have now described all the methods of isochronizing flat-springs worthy of consideration, but except by terminal curves, which may justly be regarded as the scene of horological triumphs and worthy of being treated at considerable length, so that we may make plain to all that which is as yet comprehended by very few. I may say here, that from the statement in the first part of the succeeding section (141), it would seem, theoretically, that a perfect isochronal spring could be secured in the plain flat spiral spring, and it is so held by very many good workmen. But practically, if these errors are not too great, they can be so compensated by the isochronal adjustment, as so as to perform as well as the Breguet or helical spring.

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"Excelsior" Criticised.*Below Jeweler's Circular.*

No doubt many, if not all, your readers have read with interest the papers now in course publication by "Excelsior." I would not desire to discourage any effort in literature to advance the knowledge of horology. But I think it detrimental when any class of readers will concede to without comment, all that comes before them. The "Club" made an indirect hit at (8), and also the excellent composition, in July number, by Dr. Stocking's will apply. The author first consumed his entire space in one issue by an exhaustive promulgation upon the mysteries which he would like to unfold to the anxious gaze of your uninitiated patrons (9). But I pass this by and quote the following (28): "We then find springs which the inner coil actually joining the coils, a certain proof that the watch has been in the hands of a henchman." Is a man necessarily a henchman because he is ignorant of one fact, after he has accidentally laid a small defect which can be remedied in a moment by an adept? (6) If so, then every workman in the trade will have to shudder that excelsior title, so freely bestowed by "Excelsior" upon numerous comers. (7) Because it is an acknowledged fact that no one man knows it all, and that a finished artist can often learn something from the youngest amateur. Is (10) "Excelsior" speaks of the American watch companies having made an improvement in what the collectors—lay are all at that we see out here, and I would say in what grades of watch companies, are they? (11) And we do not see "Excelsior" thank the weight of the jewel, and the necessary amount of dollars would be made to make up the lost weight out of the roller for the passage of the guard pin and reception of the jewel? (See 7). Respectfully,
R. R. P. SCOTT.
Cairo, Ohio.

NOTES BY EXCELSIOR.

(a) Read section 7. (6) Mr. Scott evidently has a fellow feeling with Messrs. Hayspring, Twiss and Screen-sweeper. I would recommend him to their tender sympathy, and request as a personal favor that they will condescend with him and soothe his lacerated feelings. (c) This is a mistake. If Mr. Scott will take the trouble to read it again, and try to understand what I said, he will see that I gave some general advice, quite as much in regard to any special directions could be, and very proper to precede them. Mr. Scott seems to stand sadly in need of it, I would therefore recommend him to turn back to the beginning, and learn the first lesson thoroughly before going any further. As many readers may not have the April number of the Circular at hand, I will quote one paragraph from that article, to show how utterly defective of reason Mr. Scott's remarks are:

"Much of what I shall say will, of course, be the standard practice among good workmen, and therefore not new to them. But I must take the risk of telling what is familiar to such for the sake of it. But much larger class who have not had the opportunities of the former for learning. Another large share, however, will be the results of my own experience, investigations and observation, now and valuable even to experts and first-class workmen. I shall not claim perfection, either in judgment or experience, but if any specialist knows more about any particular subject than the writer, has a better way or tool than I name, and will prove it by writing out his views thereon, I have no doubt that the editor and all workmen, as well as myself, will be glad to have him do so."

(d) Yes, if it is a fact that every one but a henchman knows it. (e) That is not a small defect, but a vital one, and any workman who will have a watch in that condition, or any other of like injurious character, is certainly a henchman, whether he does it from ignorance, carelessness, indifference, or any other reason. A good workman is one who does his work well, and does not put up a job that he knows it is right. And the more easily a defect could have been remedied, the less excuse there is for not doing it. Neither ignorance nor accident can shield a man who half-does his work from bearing his proper title. (f) It is the stuck pig that squeals. (g) This should have read "without any open work."

There are other points which I might speak of, but I have already wasted too much powder and space. These articles are written amid the hurry of business, and it is quite possible that I may have fallen into error, or omitted to express myself with perfect precision. If any one can point out an error, or suggest a better way, I will be obliged to him for so doing. But my time is too much occupied to allow me to answer more trivial objections hereafter.

Hints to Watchmakers and Jewelers.**ALLOYS—CONTINUED.**

1. *Pale gold for coloring Enamelling, or Lapping*—Fine gold, 1 oz., fine silver, 9 dwts., fine copper, 2 dwts. 12 grs.
2. *Another ditto*—Fine gold, 1 oz., fine silver, 9 dwts., fine copper, 3 dwts. 12 grs.
3. *Another ditto*—Fine gold, 1 oz., fine silver, 10 dwts., fine copper, 3 dwts. 12 grs.
4. *Enamelling Gold No. 1*—Fine gold, 1 oz., fine silver, 1 dwts. 12 grs., fine copper, 2 dwts. 12 grs.
5. *Enamelling Gold for Sterling*—Sterling 1 oz., fine silver, 8 grs., fine copper, 2 dwts. 12 grs.
6. *Gold solder for case*—Fine gold, 1 oz., fine silver, 7 dwts. 12 grs., fine copper, 6 dwts. 12 grs.
7. *Another ditto, cost 43s. 6d., or 10.50 per oz.*—Fine gold, 12 dwts., fine silver, 7 dwts. 12 grs., fine copper, 6 dwts. 12 grs.
8. *Enamelling Gold No. 2*, cost 50s. per oz.—Fine gold 1 oz., fine silver, 9 dwts. 12 grs., fine copper, 7 dwts. 12 grs.
9. *Enamelling Gold No. 3*—Fine gold, 1 oz., fine silver, 14 dwts., fine copper, 1 oz.
10. *Enamelling Gold No. 4*—Fine gold, 2 ozs. 5 dwts., fine silver, 1 oz. 6 dwts., fine copper, 1 oz., pin brass, 5 dwts. 11.
11. *Enamelling Gold No. 5*—Fine gold, 1 oz., fine silver, 12 dwts., fine copper, 6 dwts. 12.
12. *Enamelling Gold No. 6, for transparent enamelling*—Fine gold, 1 oz., fine silver, 14 dwts., fine copper, 6 dwts. 12.
13. *Gold solder for case*—Fine gold, 1 oz., fine silver, 1 oz., fine copper, 10 dwts., silver solder, 8 dwts. 8 grs. 14.
14. *Pale gold alloys for polishing, &c.*—Fine gold, 1 oz., fine silver, 5 dwts. 12 grs., fine copper, 3 dwts. 12 grs.
15. *Another No. 2*—Fine gold, 1 oz., fine silver, 1 dwts. 10 grs., fine copper, 1 dwts. 4 grs. 10.
16. *Pale gold alloy*—Fine gold, 1 oz., fine silver, 4 dwts., fine copper, 2 dwts. 15 grs. 17.
17. *Another pale 18 carat gold*—Fine gold, 1 oz. 12 grs., fine silver, 3 dwts. 8 grs. 18.
18. *Pale Gold Solder*—Gold alloyed, 1 dwts. 6 grs. 19.
19. *Alloy for best Pens*—Fine silver, 1 dwts. 10 grs., fine silver, 5 dwts. 12 grs., fine copper, 7 dwts. 12 grs., spelter, 1 dwts. 6 grs. 20.
20. *Solder for ditto*—Fine gold, 6 dwts., fine silver, 7 dwts. 3 grs., fine copper, 6 dwts. 21.
21. *Medium quality pens*—Fine gold, 1 dwts. 10 grs., fine silver, 5 dwts. 12 grs., spelter, 1 dwts. 6 grs. 22.
22. *Composition for the last*—Fine silver, 1 oz. 17 dwts., fine copper, 5 ozs. 15 dwts., spelter, 18 dwts. 20 grs. 23.
23. *Solder for ditto*—Fine gold, 1 oz., fine silver, 1 oz., pin brass, 1 oz. 24.
24. *Gold for common pens*—Fine gold, 1 oz., fine silver, 2 ozs., fine copper, 1 oz. 25.
25. *Solder for ditto*—Fine gold, 1 oz., fine silver, 3 ozs., pin brass, 1 oz. 26.
26. *Alloys of Gold with Brass*—No. 1—Fine gold, 1 oz., fine silver, 5 dwts. 6 grs., fine copper, 3 dwts. 12 grs., pin brass, 18 dwts. 27.
27. *Another ditto*—No. 2—Fine gold, 1 oz., fine silver, 4 dwts., fine copper, 4 dwts., pin brass, 16 dwts. 28.
28. *Another ditto*—No. 3—Fine gold, 1 oz., fine silver, 5 dwts. 12 grs., fine copper, 3 dwts. 12 grs., pin brass, 18 dwts. 29.
29. *Another alloy*—Fine gold, 1 oz., fine silver, 3 dwts. 21 grs., fine copper, 9 dwts. 3 grs., composition, 5 dwts. 6 grs. 30.
30. *Another ditto*—Fine gold, 15 dwts. 6 grs., fine silver, 5 dwts. 16 grs., fine copper, 3 dwts. 21 grs., composition, 12 dwts. 31.
31. *Composition for the last two alloys*—Finest copper, 1 oz., spelter, 5 dwts. 32.
32. *Solder for Forgery alloys*—Gold alloyed, 1 dwts., fine silver, 12 grs. 33.
33. *Imitation Gold 575 per oz.*—Fine silver, 2 ozs. 5 dwts., fine copper, 1 oz., composition, 1 oz., keeps its color very well. 34.
34. *Composition for ditto*—Fine copper, 11 ozs., spelter, 2 ozs. 35.
35. *"California" Gold*—Fine gold, 5 ozs. 11 dwts., composition, 1 oz. 17 dwts. 36.
36. *Composition for "California"*—Fine silver, 7 ozs. 17 dwts., fine copper, 33 ozs. 12 dwts., spelter, 5 ozs. 12 dwts. 37.
37. *Another Gold*—Fine gold, 1 oz., fine silver, 12 dwts., fine copper, 13 dwts. 38.
38. *Bright Gold*—Fine gold, 1 oz., fine silver, 7 dwts., composition marked No. 34, 1 dwts. 6 grs. 39.
39. *Common Gold No. 1*—Fine gold, 1 oz., fine silver, 8 dwts., composition No. 34, 1 oz. 12 dwts. 41.
41. *Common Gold No. 2*—Fine gold, 5 dwts., fine silver, 3 dwts. 6 grs., fine copper, 5 dwts. 12 grs. 42.
42. *Gold for Fine*—Fine gold, 1 oz., fine silver, 5 dwts., fine copper, 1 oz., spelter, 5 dwts. 43.
43. *Dry Colored Scribe*—resolued to 1 oz. 8 dwts. 12 grs. 44.
44. *Gold*—Fine gold, 1 oz., fine silver, 2 dwts., fine copper, 17 dwts. 12 grs., spelter, 4 dwts.

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Assaying Gold and Silver.

Sometimes the gold button bumps in the flasks. To avoid this, do not use pieces of charcoal, as nitrous acid is thereby generated, unless the charcoal is very pure and well burnt. Use in preference small clay balls of the size of a pea; one in each flask. Sometimes the operator has a piece of alloy to assay, quality and contents unknown; proceed as follows:

Weigh off 12 grains on the assay balance most carefully. Open this piece with about 300 grains of lead. Make result; correct for the lead; the result is fine gold and silver, and the difference some base metal. Say the difference is 3 grains. Note this down in your note-book. Now add two and a quarter parts of pure silver; cupel as described above, with about 20 grains of lead, and the resulting button is flattened out and dissolved as usual. Note the weight, say 6 grains, and the amount of silver is determined. The assay stands thus:

Base metal,	-	3 grains
Gold,	-	0 "
Silver,	-	3 "
		12 grains

in all; or, as the 12 grains taken represent a troy pound, and as a troy pound contains 12 oz., the report is sent in as follows:

Base metal,	-	3 oz. in the pound troy.
Gold,	-	0 "
Silver,	-	3 "
		12 oz.

These assays are called "parting" assays when the amount of fine gold and silver is wanted.

Gold bullion can be assayed with different weights, and reported as so many carats as follows:

Weigh off a quantity of the gold to be estimated, equal to the weight representing 24 carats. Take 25 grains of pure silver, and cupel the whole with about 250 grains of pure lead. Dissolve in the acid solutions as usual, and weigh the resulting gold. Place the 22-carat weight in the balance and place the gold in the opposite pan of the balance. If the gold is standard, they ought exactly to counterbalance; if it only weighs 21 carats, however, it is "one carat worse"; and if it weighs 23 carats, it is "one carat better."

In parting assays, not more than two and a half parts of silver should be added to the above proportion, to sublimating the quartized button to the acid solutions. If three parts are added, the gold is obtained in the form of a fine powder, much more difficult to weigh up than a single piece of gold. As a general rule, about two or two and a quarter parts are sufficient for general purposes.

Supposing that, after assaying silver or gold, the result either get silver poor in gold, or gold rich in silver, or, in other words, where the silver far exceeds the limit of quantity, the button must be dissolved out as usual, and dissolved in nitric acid. The gold will remain under the form of a brownish powder, which can be dried immediately, or cupel with a little lead in a cupel. If the quantity is very small, we can take the powder and dissolve it in aqua regia. Should gold be present, the liquid is tinged a yellow color; if a drop of solution of chloride of tin is added, a violet hue is produced. Most minute traces of gold can be detected by this means.

The blowpipe assay of gold is conducted in the same manner as that of silver; but as these two metals cannot be separated by any means before the blowpipe, the button obtained must be parted by the wet process as usual.

ASSAY OF TIN

This substance is always under the form of oxide, or in alloys.

The only method of assaying tin ore is by the dry process. Many wet methods by volumetric analysis have been proposed, but as no known acid or acids will dissolve oxide of tin, they are all fallacious. The oxide may possibly be dissolved after previous fusion with potash, but this is only a clumsy expedient. All wet methods will therefore be omitted.

First Method.—Grind up the tin ore very carefully in an iron mortar, and get it through an 80 sieve. As this is exceedingly laborious work, it is well to do it by proxy. After grinding and sieving, mix it up well in the mortar for five or ten minutes, till the powder no longer appears gritty, but homogeneous. Half the discrepancies in tin assays arise from bad sampling. Always take two assays of the same sample.

Take 1000 grains of the well mixed ore; van it to remove as much silica as possible, and place it in a large blue-pot crucible with 200 grains of anthracite coal, not too fine, about through a 40 sieve. Mix the contents up well, and powder over the top with a layer of anthracite. Place the blue-pot and contents at a strong white heat for twenty minutes in the refining furnace. Lift the pot out, and scrape down the sides with the charred end of a stick till it is quite clean. Put it in the furnace again, and give it the very strongest heat possible for a quarter of an hour. Lift out the pot, and pour into a mould as quickly as possible.

Allow the pot to cool, and scrape out the residue with a knife into an iron mortar. Wash off as much as possible of the charcoal slags, etc., and run down the remainder in a common Cornish crucible with carbonate of soda. Proceed as usual, and add the result to the first ingot. In this operation great care must be taken to grind the ore fine, to have your furnace at a white heat, and to pour carefully the first time. The best way to effect this latter operation is to push back the slags, etc., from the molten metal in the crucible with a piece of stick, and to place the mould across the mouth of a large iron mortar, and then pour out as much as possible. All that does not go into the mould drops into the mortar. This method gives fair results. The best objection is that it requires such a high heat, which the explorer cannot often obtain.

Second Method.—Take 100 grains of the ore, and 100 grains of pure silver. Carefully pounded common cyanide of potassium, and mix up in a small Cornish crucible, together with 25 grains of charcoal, and place the whole in the furnace, under 50 or 60 grains of potassium, and place the crucible in the reducing furnace for twenty-five minutes, at a low heat—only enough to keep the cyanide from solidifying. Cover over the top with a piece of broken pot. Give a minute's slight increase of heat at the finish, and pour into a mould. The results by this method are exceedingly correct. This method possesses the great advantage of not requiring a higher heat than an ordinary kitchen fire. Some precautions, however, must be taken when pursuing this method of assaying tin.

The best place to put the crucible is on the top of the furnace, with the top bricks open, much the same as in roasting operation. The crucible must be placed in the pot as the pot is as the bottom, so as to let the fused cyanide run down well, and not adhere to the sides. The piece of charcoal must be kept in the middle of the crucible and the contents as hot as the bottom, by confining the heat as much as possible. The object being to keep the cyanide in the liquid state, to volatilize it, if dense white fumes come off the furnace is too hot, and the crucible must be immediately removed.

Domeyko proposes the following: Treat 100 grains of the mineral with aqua regia, and after washing and calcining the residue, it is mixed with 20 grains of charcoal of white sugar, and covered with 100 grains of the same fine charcoal. The mixture is placed in a small porcelain crucible for a quarter of an hour, in a good muffle furnace: the crucible is then taken out, and the residue treated again with aqua regia, and the tin precipitated from the solution by pure zinc.

Domeyko also recommends the use of cyanide of potassium as follows:

Take 50 grains of the ore, and treat it as above described, but as heating it in a muffle furnace. Then, instead of taking out the crucible and treating the residue with aqua regia, 350 grains of cyanide are introduced into the crucible, and the whole heated for five or ten minutes at a cherry-red heat.

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Curiosities of Clocks and Watches.

By EDWARD J. WOOD.

Sully, writing in 1724, says that there were a number of watchmakers throughout Europe who, knowing the high value set upon English watches, made no scruple to apply the names of the most skillful masters to their own productions. That watches of British make were highly esteemed both by the noble and the scientific the following anecdote will serve to illustrate.—Mauritius, a French mathematician, was made prisoner at the battle of Molwitz, and taken to Vienna. The Grand Duke of Tuscany, afterwards Emperor, pleased at seeing a man of such great reputation, treated him with marked kindness, and asked him whether he regretted the loss of any particular property which the Hunsars had taken from him. Being much pressed to answer, Mauritian acknowledged that he wished to have saved a watch of Graham's make, which he had used in his astronomical observations. The Duke also had one by the same maker, but it was enriched with diamonds. "See," said he, taking the watch from his pocket, and presenting it to the *seigneur*, "it was but a joke, they have brought it to me, and I now return it."

The reputation of Graham's watches was very great during the last century, and he became the acknowledged watchmaker of the day. The "London Magazine" for 1753 gives us an account of the ingredients required in the manufacture of a top—"Monsieur Al-made." One was—

"A repeater by Graham, which the hours reveals, A most over-balance with knick-nack-and-nails."

Lord Chesham has the following choice and curious watches:—A watch with an oval sapphire case, set round in front with sparks of diamonds, mounted in gold. It is attached to a short gold chain; and it was made by Graham. A gold double-case repeater-watch, pierced and chased in relief with Orpheus and animals, by the same maker. It is attached to a chate-laine, chased with trophies, from which are suspended two heart-shaped lockets and two keys. A gold double-case watch, chased in relief with the offerings of the Magi. Graham made this one also. It is suspended from a chate-laine, from which hang two seals, two brooches, and a miniature of a lady. A gold repeater-watch in a double-case, chased and pierced with busts and scrolls, by the same maker. It is attached to a gold chain. A double-case repeater-watch, chased and pierced with coronets and scrolls. On the back are a cipher and coronet set with diamonds. The maker was Collier, of London. It is attached to a chate-laine, containing a compass, calendar, seal, small watch in a filigree case, and two keys. A gold watch, made by Jodin, of Paris, attached to a chate-laine, both being enamelled with hawking, animals and birds; and with them are two enamelled scrolls and a key. And a gold watch set with diamonds, the center of the case being a bloodstone. The maker was Hahort. It is suspended from a chate-laine, to which also hang tassel and a locket containing hair.

The Royal Society are in possession of a gold watch which was presented by Mrs. Conduit to Sir Isaac Newton, who was born in 1642, and died in 1727. The chasing on the outer case is beautifully executed, and represents Britannia pointing to a medallion, on which is a bust of the philosopher.

At a meeting of the Society of Antiquaries of Scotland, held on April 11th, 1864, an account of a gold watch, which was said to have belonged to Prince Charles Edward Stuart, was read by Mr. George Seaton. It appeared that this watch belonged to a lady who had then recently died in reduced circumstances, and that her maternal grandmother was the eldest sister of John Leslie, the eight and last Lord Lindores, who died without issue in the year 1814. In the belief that this watch had formerly belonged to the Prince, and that the King of Sardinia was then the representative of the house of Stuart, its late owner bequeathed it to that monarch.

Mr. Seaton pointed out that in this last master she was clearly mistaken, as the representative of the house of Stuart was Francis V. of Modena. The watch was described as having an unusual arrangement of the Roman figures on the dial, the hours being engraved on little lozenge-shaped plates, and the filigree case having as ornaments six white stones or crystals. Dr. John Alexander Smith exhibited a curious watch, the gift of Gustavus Adolphus to a Scottish officer in his service. It was oval in shape, with cases of rock-crystal set in silver, and an inscription, "Donum Gust. Adolphi Regis Justici Jacobi Braster Trilivii, Militem Virtutis Premiums." The officer was Colonel Brainer, who is said to have married Lady Brunton, sister of General Leslie, who was created Earl of Leven, and it now belongs to his descendants, the family of the late Captain Brainer, R.N., of Falmouth. It was exhibited by the good offices of Mr. Ralph E. Scott.

Covestry is famous for its watchmaking, which commenced there early in the eighteenth century. In 1727, George Potter, a watchmaker, was mayor of the city. There are now several large watch companies at Covestry, that of Rotherham and Sons being the largest, and the only one in which steam-power is employed for turning, polishing, and miller purposes. One hundred and eighty persons work on the premises. This firm was established in 1747 by Samuel Vale, and continued for many years under the names of Vale, Carr, and Rotherham.

The "Daily Post" of Friday, February 14th, 1725, contains the following:—

"Whereas a Gentleman's Coach was robbed by two Highwaymen, between 6 and 7 of the clock, the 11th Instant in the Evening, between Hyde Park Corner and the Back of Buckingham House, in the road to Chelsea, and took away a Gold Watch and a Diamond Ring, with some money and a Sword. The watch was made by Williamson, London; and in the Case was an Equation Table by Edmund Sturges, Watchmaker, Dublin. And the Ring had this Inscription, H. B. Knt. ult. 1 July 1714. To the Watch were two Seals, one a Crystal of Socrates' Head, set in Gold; another triangular with Arms engraved, viz, a Sable Cross over the Arms of Ulster, and a South-east of Porten, bearing a Butterfly, Field Azure with three Bars Gold. If any of the above-mentioned are offered to Sale; or if the Watch, &c. by restor to the person apprehending, or restoring the said Watch and Ring shall have 6 Guineas Reward; to be paid by Mr. Pote, Bookseller, at Sir Isaac Newton's Head, Charing Cross, or in proportion for any Part. Among the Pieces of Money taken, there was a Half Crown of Philip and Mary. And on the Scabbard of the Sword there was engraved, on a thin Plate of Gold, Ralph Jackson, Dublin."

In the South Kensington Museum is a watch, with chate-laine, seal, and key attached, in gold richly chiselled and embossed. The length is seven inches and three-eighths and the diameter one inch and three-quarters. The date is about 1790; and it was purchased for £24.

Lord George Littleton, between the years 1730 and 1740, wrote the following lines to Miss Lucy Fortesque, with a new watch:—

"With me never present may thy lovely eyes
Be never turn'd on upon this golden toy,
Think every pleasing hour too swiftly flies,
And measure time by joy succeeding joy.
"But when the cares that interrupt our bliss
To me no always will thy sight allow,
Then off with kind impudence look on this,
Then every minute count—as I do now."

The Ames Company, of Chicopee, now have in their sword department a large Toledo blade, about four feet long, elaborately etched with gold, belonging to General Bate, which they are now offering. An artist from New York is now engaged upon a design for the hilt, and the Company will make this the most elaborate sword ever manufactured at our works, intending to place it on exhibition at the Centennial with other specimens of their sword manufacture. When finished this one will be worth over \$1,000.

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HISTORY OF THE GLYPHIC ART.

By C. W. KING.

Rings formed entirely of gold have been brought to light in considerable numbers by recent excavations, having their faces engraved or punched out in arabesque figures (*graffiti*) of an unmistakably Oriental character. In all such there manifests itself an ennobling at monstrous combinations which clearly points to the true source whence the artist drew his inspiration: the Babylonian or Phœnician works of the same description. Compare the Etruscan arabesque, the heraldic patterns, for example, the so-called honeysuckle, the winged deities, and the symbolical animals, the harpies, sphinxes, gryphons,—in short, every design of the intricate ornamentation decorating the Assyrian bronze plates lately discovered,—compare all these with the *graffiti* on either the rings or the mirrors of the Etruscans, and the immediate derivation of the latter style from Assyria becomes incontrovertibly obvious. Through the study of these relics, joined to the recognition in Oriental workmanship in all Etruscan jewelry, the crowns, bracelets, (chiefly discovered about Valci,) etc., has the traditional Asiatic origin of the nation, as well as their love for personal decoration, so often noticed by ancient writers, received in our times the most conspicuous verification.

Again, if we proceed to consider their *scarabei*, more exactly those whose style betokens an earlier date, these, equally in material, form and taste, point to Asia as the genuine land of their nativity. Their favorite stone, the Oriental sard, bears testimony, by its very name (from the Persian *sard*), equally as decisive as to the country that supplied it. Together with the gem, came into Italy the art of engraving upon it; nay, more, the engravers themselves by a continuous immigration. There is a striking analogy in the mode of producing the designs upon the *scarabei* in question by means of unassisted drill-holes and the technique characterizing the agate and calcedony cylinders belonging to the Second Period of Assyrian Art.

These signs, like the lionman, retain the form of the Beetle. Why both nations should have conceived so persistent a partiality for that Egyptian fashion can only be a matter for conjecture. But it may be that, as the received symbol of the sun, this insect-form had recommended itself to the Phœnicians—those exclusive worshippers of that luminary, under the name of Bael: the beetle having acquired this honorable distinction amongst the Egyptians from its habit of turning globes, types of the world, as receptacles for its eggs, thus symbolizing the creation and its Author. (Plin. xxx. 30.) Elian, moreover, states that the warrior caste amongst the Egyptians wear beetles in their air as a badge of their profession, because the insect typified manliness, being, according to the popular belief, exclusively of the male sex. From this notice of Elian, Kiehl ingeniously conjectures that amongst the Etruscans also this was at first the distinction of the military class (as the gold ring was the Roman knighthood); and upon this hypothesis he proceeds to account for the exclusively martial character of the devices—heroes and combats—to be found upon the *scarabei* that he refers to the most ancient of his three classes. If this explanation be the correct one, the shape, in the sense of a talisman, survived the fall of Etruria, and even of Rome herself, for one, engraved with Heracles at the fountain, had been deposited along with his other jewels in the sepulchre of the Frankish King Childeric at Tournay, evidently from a lingering belief in its prophylactic virtue (Chiffet's "Anastasis").

As for the subjects constituting the signet itself, the majority of *scarabei* that come to light (more particularly to those whose elaborate gold mountings indicate a period of extreme opulence in the first owners) bear only the delineations of animals domestic or wild, or else the single figures of deities and men. It would seem that it was not until after their intercourse with the Greeks had been long established, that they began to attempt embodying upon the field of the signet the personages

and the scenes derived immediately from the mythology and poetry of that people. This circumstance was the necessary consequence of their national origin (which has been already established from other considerations) concerning which the ancients were unanimously agreed; that the Etruscans or ruling caste amongst the Etruscians were a civilizing colony from Lydia, who planted amongst the rude aborigines of Central Italy arts of luxury already flourishing in their native home. Their predecessors, the Pelagi, of the same stock had already founded cities, like Cere, there, and speedily became amalgamated with the new comers.

The colonists of Doric race in the southern parts of the peninsula, the flourishing states of Magna Græcia, seem to have adopted from the Etruscans the peculiar form of the *scarabeo-signet*, and in all likelihood actually to have first learnt from them the art of engraving gems. For Castellan informs me that in the innumerable tombs of the earliest Greek colonists (notably at Cumæ founded a thousand years before our era) opened by him in the search for painted vases, he has never been able to discover a single engraved gem; nothing else but rings, cut as sigets, rudely formed in silver. These Dorians, in their turn, communicated a tincture of their own mythological and poetical learning, together with, it is natural to suppose, the improvement in design that now becomes conspicuous in Etruscan works, the result of their own greater advancement in modeling, vase-painting and sculpture.

This secondary process of education may possibly explain the circumstance, at first sight so puzzling, the apparent contemporaneous production of two classes of *scarabei*: the one extremely barbarous, the other most exquisitely finished as regards the intagli upon them. This latter restriction is necessary, for indeed it is a remarkable fact that we often meet with large *scarabei* of the first kind, in which the beetle itself is modelled with perfect skill, mounted in elegant and costly settings, whilst their devices in its intaglio appear to betoken the very infancy of the art.

The first gem-engraver on record, Mnæarchus, the father of Pythagoras, we have already found practicing his art at Samos, close to the Lydian coast, before the year B. C. 570; and he is said by Aristotle, (as quoted by Diogenes Laertius) to have been by birth a Tyrrhene belonging to one of the islands seized upon by the Athenians. This event may be connected with the explosion of the Pelagi from Lemnos (detailed by Herodotus), which took place about this period. Mnæarchus, thus driven from home, takes refuge in Samos, probably still in the possession of a kind of dracæ. In this brief notice of Aristotle's, two important facts for our purpose are involved: it records a Tyrrhene exercising the profession of a gem-engraver, and likewise the causes that dispersed such artists, with the rest of their brethren, far and wide over the coasts of the Mediterranean; for his illustrations soon, doubtless, according to modern rule, run up in internal trade, subsequently establishes himself and philosophy at Metapontum.

In order to secure perfectly regular motion in the clock work applied to revolving lights in light-houses, Dr. Hopkinson, the scientific adviser of the glassworks of Messrs. Chance & Co., near Birmingham, states that he has introduced a simple centrifugal governor. The governor balls have to lift a heavy weight, which is in the form of a fly-wheel, and the circumference of which, on being raised slightly, presses against certain fixed parts, the friction of which soon diminishes the velocity of rotation of the fly-wheel and the governors sufficiently to allow these latter to fall back to their original position. He calculates that work to the extent of 500 pounds per minute must be done on the governor in order to accelerate the clock one second per hour. This form of governor possesses the advantage that it checks any acceleration of the clock more promptly than when friction rubbers are carried by the governor balls; and it is also easy to adjust.

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Jewelry Repairing.

By H. G. M.

Probably there is not anything upon which the reputation of a keeper of a jewelry store is more easily built up than the neat and substantial repairing of the jewelry of his patrons. The intrinsic value of a filled ring may be almost nothing, but to the owner it is surrounded by a halo of associations which give it priceless worth, and if broken by accident its neat repairing is very highly appreciated. So also the cleaning of jewelry, which through discoloration has lost its beauty, is often looked upon with delight as marvelous.

Perhaps a few hints on this subject may be of use to some who have met with difficulty in making repairs to their satisfaction.

It is of first importance that the use of soft solder be avoided as far as possible in repairing articles made of gold or silver solder and even filled and plated jewelry may be repaired with hard solder.

To repair a ring, the shank of which requires cleaning, bury the head in a crucible full of wet sand, place a small piece of charcoal against one side, coat the break, previously cleaned by filing or scraping, with borax, and charge with solder, blow a flame against the ring and charcoal till the solder runs in. For articles which require to be protected from discoloring in the process of soldering, coat them with a mixture of lard and charcoal, or, if necessary, adding a little dissolved gum tragacanth to make it lay all over, allow it to dry, then charge with borax and solder and heat sufficiently, lay out in weak pickle made of nitric or sulphuric acid. One important point is to wash the piece well in hot water with a little ammonia in it before attempting any repairs, this removes all dirt and grease, which if burned on, cannot be removed.

If the article be of colored gold, boil it in pickle made of muriatic acid, and never coat with any protecting mixture. The solder must vary in regard to fusibility according to the quality of the article. For repairing most filled work, very easily melted solder is required which may be made of 1 oz. fine silver, 10 dwts. hard brass wire, adding just before pouring 2 dwts. zinc, or to make it more fusible use bar tin instead of zinc, or for strong silver solder use only the silver and brass. For repairing most bright gold work, use gold coin 3 dwts, fine silver 3 dwts, fine copper 2 dwts. For colored work, fine gold 1 dwt., silver 17 dwts, copper 12 grs, hard brass wire 2 grs.

A good solder for repairing spectacles or other steel work is made by melting together equal parts of silver and copper. In soldering steel plenty of borax should be used.

Very often the want of a rolling mill is a great obstacle to the making of solder, but it may be flattened very thin, although not with great regularity, by pouring on a flat piece of wood and putting the flat surface of a piece of iron upon it while quite melted, a piece of cigar box is good to pour it on, as the odor given off is not very disagreeable, and the solder may be melted in a hollow in a piece of charcoal by using gas and a blowpipe.

For cleaning colored gold, a mixture of 1 lb. of soda, 1 lb. of bicarbonate of soda, and 1 quart of water will be found useful, it should be placed outside the building after mixing, and when settled the liquid poured off and the sediment thrown away, with great care this may be used for cleaning gilt bronzes, and cheap gold, and plated jewelry, but caution is necessary, as it will corrode brass very rapidly.

To remove lead solder from badly repaired jewelry, place the piece in muriatic acid and leave till the lead is eaten away, it is best always to heat the piece gently and brush off the lead while melted before subjecting to the action of the acid as too long a soaking is not desirable.

Set pearls which have become discolored by wear may often be improved by placing in a covered vessel with a mixture of whiting, ammonia and water and permitting them to remain a few hours.

A good powder for cleaning jewelry, silver, watch cases, &c., is made by mixing about four parts of whiting with one of rouge, using with alcohol or water, this

it will be found is easily brushed out of crevices, engraving, &c.

Many are not aware of the fact that the gold and jet jewelry, which has been worn so much for years, can be hard soldered with easy running solder without removing the jets, but it is easily accomplished by coating the gold with ochre and laying the piece with the jets up while soldering, care being taken not to smoke the jets, an alcohol lamp is perhaps preferable to gas for this purpose, but in most cases gas answers best for soldering.

Official List of Patents

PREPARED EXPRESSLY FOR THE JEWELER'S CIRCULAR.

Issued by the U. S. Patent Office for the month ending Nov. 4th, that relate to arts and manufactures represented by the JEWELER'S CIRCULAR.

167,872—Escapement for Watches.—E. Bourquin, La Heutte, Switzerland.

Beltz.—An escape-wheel formed with two rows of reversely inclined teeth, acts upon a single pallet instead of two commonly used.

167,905—Watchmen Time-checks.—T. D. Osborne and W. W. Le Grande, Louisville, Ky.

Beltz.—In watchmen's time checks the combinations with the hand of the clock, and a hand spring and pin applied thereto, of a spring depressing button, of the glass front, and of a series of time registering pins, sliding in the guide, when it is required to be moved back at fixed periods of time.

167,933—Clock Cases.—W. N. Weeden, Waterbury, Conn.

Beltz.—A sash for clock fronts formed from a single piece of metal, the shoulders being produced by doubling the metal inward.

168,005—Compound Balance Staffs for Watches.—John J. Thornton, Cleveland, Ohio.

Beltz.—A compound balance staff for watches, consisting of the staff proper, having pivots turned on its ends, and a shoulder near its middle, above which it is screw-threaded, and an internally threaded screw or collet, which screws on to the staff proper until it abuts against the shoulder; said screw being provided with shoulders for supporting the hub of the balance, and the hairspring adjustment.

168,186—Electric Circuit-breaking Clock-work.—David Rousseau, New York.

Beltz.—A circuit-breaking train of wheels, acts only at the time when, in course of the revolution of a pin wheel in the time keeping train, the pins have advanced sufficiently to allow the escape of an arm projecting from a spindle of the circuit-breaking train.

168,429—Watch Regulators.—Charles Tasko, Saratoga Springs, N. Y.

Beltz.—In combination with the regulator arm and heated screw, turning in fixed bearings, a traversing nut, connected with the arm by elastic, caliper-shaped lever.

168,527—Watch Keys.—George P. Reed, Melrose, Mass.

168,582—Escapements for Watches.—Albert H. Potter, Chicago, Ill.

Beltz.—Arranging the tripping in a chronometer-escapement, at an acute angle, to the lever carrying the locking-pawl, by attaching it to a radial arm on said lever.

168,583—Compensation Balances for Watches.—Albert H. Potter, Chicago, Ill.

Beltz.—Auxiliary boxes, having their inner portion brass and outer portion steel, are pivoted to the arms of the balance to provide additional compensation.

168,681—Vatches.—Eugene J. Faesad, Albert H. Potter, Chicago, Ill.

168,920—Lockwork Attachments for Clocks.—E. C. Coville and M. M. Robinson, Laconia, N. H.

Beltz.—Device for permitting the hands to be turned backward without operating the striking mechanism.

168,774—Vatches.—Eugene J. Faesad, Schaffhausen, Switzerland.

Beltz.—A screw, threaded at its inner end, and provided with a flange, the latter being located between the dial and top plate of a watch, and acting in combination with an elbow lever.

159,039—Electric Clocks.—D. F. Sweet, Hastings, Michigan.

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The Clockmakers of the Schwarzwald.

The Baden State Railway, running in an unbroken line from the Rhine plain at Mannheim to the shores of the Boden See at Constance, forms two sides of that part or the Grand Duchy of Baden which in Germany is called Baulischer Schwarzwald.

Along this line go great numbers of English tourists hurrying to Switzerland, and rushing back again to England, who seldom rest for an hour in any part of this district, except in the town of Freiburg, a pleasant point to break a long and somewhat tedious journey. The dark hills which covered the pine-trees, which the traveler sees from the windows of his carriage, generally serve to remind him of the grander mountain he has left, or of the peaks which he hopes to climb. But among these hills is much picturesque and quaint scenery, of a character at once unique and distinct from that of countries more frequented by the traveller. From any high ground, lofty hills can be seen extending towards the horizon, more of dense clothed with black pine-forests, broken here and there by the lighter foliage in the valleys, or by the open patches of cultivated land. There are cottage farms, with huge black and spreading roofs, better built, and showing signs of greater prosperity and comfort than most mountainous districts. The village houses are less thickly grouped, and every village indicates an active and industrious people. The valleys are more numerous, and the landscape; the scale is small, but the perfect union of water and rock, of wood and meadow, produces harmonious and delightful pictures. Among the thick and fragrant woods the scenes are different, more weird and wild, but none the less attractive. Among these woods and hills dwell a people who inherit the sympathy and kindness of the mountaineer and the ecstasies of the shrewdness and energy of the artisan of the town. They cultivate their land with surprising care, and work at the manufacture of clocks and watches of glass and straw articles, with a diligence which has been rewarded by great success. They are so energetic and desirous of doing well in life, like the men of the Canton Grindelwald and the Oetzthal Alps, they willingly leave their own country and go away to England, America, or France, where they work hard, chiefly at clocks and watches. But to this desire for bettering their condition is united a strong love of home, so that in three or four years they come back with sufficient money to buy themselves a piece of land, on which for the rest of their days they live; they settle down, and their children will do as they have done.

The first thing which a stranger does at Furtwangen is to see the exhibition of the Gewerkevereins, and at Tryberg the Gewerke Hall, open from May to October. The latter is a wooden building of some taste, where every variety of clock can be seen which the ingenuity of the Schwarzwalders can devise or the figures execute. Round the walls and on the tables are clocks of every sort. Nearly all are of wood, though here and there is a fragile one of straw or ivory. The best which attracts attention is a very fine specimen of wood-carving; the figures and design are cut in lime-wood, and it stands two feet high. The fingers and hours are of ivory. The attendant puts it to two o'clock, and it forthwith plays a melodious air, as of the most delicate flutes. The note is still larger, and as the hour strikes a miniature band plays "Der Wacht on Rhein." We pass on to one made of beech and walnut, the dark and light wood being charmingly blended. As the figure touches the lever, two little trumpeters step out and blow the reveille. Then there are cuckoos which strike up at the hour and trunks who sing at the quarter, venerable monks standing beneath the bell-ringing the hour when midnight comes. The automaton clock comes next, and we watch a sort of Pickwickian himself, who pulls out the ball when finished striking. The taste and minuteness of the carving in the largest or the smallest point are very great; the regularity on the pendulum of the smallest clock represents, perhaps, an oak-leaf, or some simple, but still graceful object. Nor are

more methodical and stronger-looking clocks wanting; they are of every kind; they will suit the kitchen or the boudoir. The excellence of the external work is equalled by that of the machinery, for having once gained a reputation, the inhabitants of these hills take care that it shall not be lost. The Gewerkevereins, or Union, guarantee the goodness of each clock which hangs on the walls.

Thirty years ago a really good little clock could have been bought for six pence or eightpence, but now, with communication more easy, the small ones are sold for four or five shillings, the cheapest trumpet for six pounds. Every man has his special piece of work; one carves the figures, another prepares the dial, a third the wheels, a fourth the pendulum, so that on one clock many hands are employed. Under this system, within a radius of sixty English miles, the number of clocks or watches turned out annually is nearly seven hundred thousand. Figures convey but small impressions to the mind, but if it is remembered that five thousand men are working at this trade, and that there are not less than two thousand five hundred inhabitants in Furtwangen and fifteen hundred in Tryberg, it will be seen how strong a hold this trade has upon the people of the Schwarzwald.

It chanced that towards the end of the seventeenth century a family named Krenz, more enterprising or clever than the others, was not content with the village of Neukirch. They made a rude clock, works and frame of wood, with a weight, and this was given or sold to the parish priest. The clock was not used upon others of the enterprising Schwarzwalders, and the example was soon followed, and not long afterwards the farmhouses of the district began to be adorned with clock-works. Two men were very apt at the work, they may also be called the fathers of the art; their names were Lorenz Eber, called the "workman," and Johann Henninger, of St. Margen. The germs now rapidly developed; the simple carving of wooden stands or frames gave place to the more elaborate work of ornamental clockmaking; the wood, the want of other occupations, the unclean industry, acentness, and union of the people, the freedom from political and other distracting causes, all promoted this quick growth. Hawkers sold the clocks throughout Germany, and the Schwarzwald soon became celebrated throughout the empire.

The clock was at first very simple in construction, wooden wheels and carved frames. It was not until between the years 1750 and 1740 that the first cuckoo clock—which is one of the class called *Nicouds*, or clocks of amusement—was introduced by Franz Ketterer, of Solonwald, a small hamlet on the hill above Tryberg, who is the real originator of the description of clock for which the Black Forest is most noted. This was novel enough for a time, but more minds set to work, and forty years later Anthony Duffner devised the first flute clock. Soon a real, noteworthy advance took place, in the introduction of the first pendulum clock. Then the fancy of Mr. Kirn, a Schwarzwald, who had become court painter to the King of Bavaria, suggested that very pleasant instrument, the trumpet clock. There were now five hundred persons engaged in the clock trade in the Black Forest, and it had become the recognized occupation of the people. The work was all done by hand; not for some years was machinery used.

But instead of the primitive fashion of each family working for themselves, masters and workmen began to appear; and as time went on, the change became more and more complete, till in 1849, the Grand Duke Leopold was asked to assist in founding a clock and watchmaker's school. The government of Baden at once acceded, and they gave ten thousand florins for the purpose of defraying some of the building expenses and to carry on the work of the school. The community of Furtwangen gave wood and materials—and in 1850 the Clockmaker's School at Furtwangen was opened. Thus almost before the workmen of England had begun to think of technical schools, the peasants of a distant German province

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had already set one on foot. It has given new impetus to the work, and by the introduction of a special literature and instruction, in no small degree aided the general education of the people of this and the neighboring villages, as well as the actual technical branch which it was created to improve. The school has two main objects. Firstly, the education of the young by literary and theoretical teaching in the elements on which the art of clockmaking is composed, that is, in the general principles common to all scientific manufacture, and in the more intricate details belonging specially to this one branch. Secondly, the improvement of the trade by a practical school or workshop, where the theories already learned can be carried out, where new improvements and methods can be tried, and where practical instruction can be given. Two important principles are acted upon in carrying out these aims,—the instruction is free, and it is not in the place of, but subsidiary to, and based on, that which is given in the *Filzschule*, or public elementary schools. This is important to notice, because there is too great a tendency in England to begin at the wrong end, not only in the lower branches of technical instruction, but also in those of a higher and more intellectual grade, and make technical supply the place of general teaching. Briefly put, these are some of the details connected with the school. The age of admittance is fourteen, and the pupil must have passed through the first part of his examination, yearly distribution of prizes, a library containing technical and scientific books and models, and a period of study not confined to any particular time or length. The subjects taught are: (a) freehand and ornamental drawing; (b) arithmetic, geometry and linear drawing; (c) constructive drawing; (d) mechanics and natural science; (e) heads of German industry and mercantile business; (f) French, when possible.

There are a few minutiae to notice as to the workshop. The most important are that the workers must bring their own tools, unless they can show satisfactorily that they are too poor to afford them, when they will obtain them freely at the shop. The government defrays the expense of living at Furtwangen of those also who would be unable to attend out of their own means. There are saw-mills and other appliances for doing the rougher work, preparatory to the more delicate details of the instructive workshop. Lastly, the whole is under the supervision of the government, through the minister of industry. The school and shop have both succeeded well, the trade increases every year, the prosperity of the people in an equal degree. As railways are extended, and the means of communication, not only with the immediate parts of Germany, but with the more distant countries of Europe and the world, become more easy, so undoubtedly will be seen a further extension of the business of the Schwarzwald.

It will be seen from these brief sketches that the wanderer in the Black Forest can not only receive pleasure from the charms of a peculiar and beautiful scenery, but has also opportunities of studying some social features hardly to be found in more populous places. He finds—a long way from the great centres of commerce and manufactures—a simple and kind-hearted people, carrying on an ingenious trade quietly, yet actively, and keeping pace with modern improvements, for the peacefulness of the pine woods and the patriarchal simplicity of the villagers' lives seemed to enable them to labor without the disturbing influences at work among so many industrial communities.

Forged Antiques.

The ancient art of engraving upon stones, whether in the way of intaglio or cameo, has often been imitated—the stones which have been generally chosen by the engravers being of the agate or quartz section of the rock; the carnelian, sardonyx, amethyst, or even the very hardest precious stones known to us, the ruby and the sapphire. These have been engraved in various ways, but most usually by means of diamond point and powder—

"diamond cut diamond"—with rapidly revolving wheels or discs of steel. In this way, heads and groups of figures have either been cut into the stone (intaglio) or else left prominent in high or low relief in one or more shades of the stone that has been chosen for the purpose, while the background remains of another shade of color (cameo). On account of the hardness of the stones chosen for these little sculptures are, in fact, indestructible. Many of them are contemporary with the works of Phidias and other great sculptors of the finest age of Greek art; and while the larger marbles have perished, these gems have lain hidden in the bosom of the earth for well-nigh two thousand years, during all that dark and gloomy time when the decaying Roman Empire was tottering to its grave—to be turned up at last by the plowshare and the spade of a modern civilization, and adorn the cabinet of a nineteenth century gem collector. The writer of this article has in his possession, for instance, a stone (carnelian) of the exact size of the little finger nail, with a group of three figures cut upon it, and so beautifully and skillfully carved that the finest microscope can discover no flaw or imperfection in the anatomy of the figures, which are as perfect, in their way, as the dying gladiator or the Apollo of the Vatican. This gem is of the time of Augustus, and, consequently, nearly two thousand years old. The little drawer of a cabinet on the study table can, therefore, hold a collection of antique or modern gems (and many of the carvings of the eighteenth century are very good), so that a collector of moderate means and appliances may have within his reach sculptures as beautiful and perfect—although in miniature—as those which adorn the galleries of Chatsworth, or even the walls of the Vatican. It seems a strange thing that a study so fascinating as the study of an antique gem should have almost died out from among us, or rather should have altogether died out, within the last hundred years, and should only now begin to have a renaissance. And we have some difficulty in accounting for the fact. In the last century it was even fashionable to collect these wails and strays of antiquity. A dactylotheque, or cabinet of gems, was as essential part of the dignity of a European prince, particularly if he aspired to be considered a sovereign of good taste; so that even the laical mind of Louis XVIII. George III. was moved within him to purchase, at a large price, the cabinet of Count Smith, which he added to the small royal collection, mainly transmitted by Charles I. Emperors, empresses, conquerors, and philosophers were alike carried away by the mania for forming collections of gems. And, of course, all wealthy people with any pretensions to fashion and taste followed suit. But the fact is that the *Dactylotheque* (as they loved to be called) of the last century made a sad mess when they attempted gem collecting. They soon found themselves in the position of the whale between the whaler and the scoundrel. They seemed to have been imposed upon on every side and in every possible way. The dactylotheque fever ran so high that it became quite necessary for the patient to be excessively blebbed. And a class of forgers sprung up were quite capable of performing that medicinal office. The methods were various. Antique engravings were copied by the dozen, so that for every ancient gem of importance and beauty there may probably be a score or two of modern replicas about in the world. These modern antiquities were often crammed down the throats of turkeys with their food, that by the grinding of the gizzard they might obtain that roughness of the polished surface—the wrinkles of age which is one of the marks of antiquity. Rude antique engravings were touched up and repolished. And almost every genuine antique passed through the process of having the signature of some renowned artist of old forged upon it, by which its value was immediately doubled in the gem market of that day. Prices were quite tempting enough to induce clever rogues to do all they knew in order to deceive. A thousand pounds was no uncommon price to be given for a finely engraved gem which had some savor of antiquity about it.

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Watch Materials, Tools, Glasses, &c.

726 CHESTNUT STREET,

Formerly 408 Chestnut Street,

PHILADELPHIA.

CELLULOID NOVELTY COMPANY,

14 Maiden Lane, New York.

Manufacturers of

IMITATION

Coral Jewelry.



MEDALLION

Setts

A SPECIALTY.

Our goods are an exact imitation of the Imported Coral Goods. Ladies' Setts, Pin and Earrings, Shawl Pins, Crosses, Necklaces. Gents' Studs and Sleeve Buttons, Scarf Pins and Rings, mounted either in 14 or 18 gold or plate.

C. E. FRITZ,

Watchmaker & Jeweler

EVERY DESCRIPTION OF WATCHES

CLEANED, REPAIRED AND ADJUSTED

In the Very Best Manner!

Special attention given to the Repairing of Complicated Movements

FOR THE TRADE.

Front Street, Dowagiac, Mich.

Then almost in a moment, like a sudden fall in the stock exchange, the reaction came. "The thermometer fell below zero in a single night." The world of amateurs began to find out how heavily they had been duped, and resented to have their fingers any longer with the handling of antique gems. In fact, the whole art became discredited. The forger-artists of the eighteenth century, and they were a race of clever and excellent workmen, died out and left no successors behind them. Indeed, so completely had all public faith in this branch of the fine arts perished, that a dozen of years ago finely engraved gems, which would have brought hundreds but fifty years before, could be purchased without difficulty for as many pence. For a second time in the world's history the art of gem-engraving disappeared from the centres of culture and civilization.—*Fraser's Magazine.*

Personal.

Mr. Mansfield, of Mansfield & Baird, Philadelphia, Pa., is in town.

Mr. Ogden Crittenden, of Cleveland, O., is also in town, selecting novelties for the holidays.

Mr. G. R. P. Carpenter, of G. R. P. & E. H. Carpenter, Burlington, Iowa, is still in New York.

Mr. Tress, of Tress & Harrington, Columbus, O., is making an extended visit in the city.

Mr. Mathew, of the firm of Mernad Jaccard & Co., St. Louis, Mo., has been in town for several days.

We congratulate Mr. Ralph Earl, of the firm of Hunting & Earl, upon his recovery from his recent severe illness.

Mr. E. Lilienthal, of New Orleans, La., has just returned home with a large and well selected line of holiday goods.

Mr. W. H. Hennegan, of the firm of W. H. Hennegan & Co., Baltimore, Md., is in town purchasing holiday goods.

Mr. A. H. Hayden, of Charleston, S. C., who was lately burned out, has risen, Phoenix-like, and is in town buying a full stock of goods for the new store which he just erected on the old site.

Our good friend, C. E. Fritz, whose contributions to this Journal have been universally read and admired, has removed from Onondaga, N. Y. to Dowagiac, Mich., where he is prepared to do all kinds of repairing for the trade. Mr. Fritz is a member of the British Horological Institute, and the inventor of the Watchmaker's Union Lathe, the Radical Segment Chronometer Balance, and many other well known improvements of recognized importance. We can assure our readers that all repairs entrusted to his care will receive prompt and careful attention, and will be executed in a workmanlike manner. We trust that his success will be as great as it is deserving.

A method of bronzing cast iron, recently introduced in Paris, is said to render the copper so thoroughly adherent to the iron that, if an accident happens, the cast iron will sometimes scale off with the copper; it is said, moreover, that the deposit of copper is perfectly even, not thicker on salient parts than in hollows or under cuttings. Mention is made of a number of huge statues having been covered with copper by this method, and among other works, two bulls, larger than nature, presenting each a surface of at least one hundred and thirty-two square feet, and on vases, candelabra, and decorative castings of every kind—all with invariable success—and the copper deposited on the work is never less than 1-10th of an inch in thickness. It is stated that the cost of these works is not more than doubled by this valuable application, and the copper, when carefully treated by a French bronzeist, presents an appearance very little inferior to genuine bronze. This process is also applied successfully to the tinning of copper or cast iron vessels, and the coating of tin may be of any desirable thickness; the articles are simply first covered with a thin coat of copper, and are dipped into a bath of chloride or fluoride of copper and erythrite, to which chloride of barium is added.

Antient Measurements.

At a recent meeting of the Society of Biblical Archaeology, a paper on "Antient Metrology," by Mr. F. F. Conder, C. E., was read. In this paper Mr. Conder illustrated the confused and contradictory state of our present knowledge of the subject, and proceeded to establish an absolute metrical base, identifying the barley-corn, which the Hebrew writers state to be the unit of length and weight with the long measure barley-corn and with the Troy grain. The grounds of identification were—(1) actual measurement and weight of full-sized grains of barley at the time of the harvest; (2) determination of specific gravity according to statements made in Hebrew literature; (3) actual dimensions of ancient Jewish buildings, and actual weight of a Babylonian talent now in the British Museum, which corresponded to Mr. Conder's determination of 960,000 Troy grains within one per mille. The remarkable double division of the Chaldean metrical system, which is both decimal and duodecimal, was then explained, and shown to apply to measures of length, area, capacity, and weight. The origin of the Troy ounce, the drachm, carat, the Spanish ducat, and other existing divisions is traced to the early system employed by the Phœnician traders.

The Palace Hotel at San Francisco.

It is said that the Palace Hotel at San Francisco, which is now finished, is the most spacious inn in the world. It contains many novelties, conveniences and comforts which have never before been introduced into any other hotel in this country. There are three large inner courts, covered with glass, with carriage and promenade entrance from the street, a circular drive-way, and a large central hall, a circular drive-way, and a tropical garden of exotic plants, adorned with statues and fountains. There is also a pavilion for the use of the musicians to be exclusively employed at the hotel.

The breakfast room is 110 by 55 feet; the main dining room, 130 by 55 feet; and the ball room, 60 by 55 feet. It is elegantly furnished in every particular with large quantities of chandeliers, plated ware, chandeliers, carpets, etc. The chandeliers, brackets, candelabra, &c., are in real bronze and gilt, and were made from special designs by the artist and Painter, Messrs. J. & W. S. of this city. It is believed to be the largest order ever given at one time in this country for glass fixtures. It contains more than twenty-five square, and number seven hundred and fifty-five, and have separate bath rooms. Each of these rooms has a new and very beautiful style of chandelier in five lights, recently patented by the Archer & Co. of New York, and known as the "Excelsior Centre Candle or Library Chandelier." This fixture is provided with a centre light, having an arched burner, which may be lowered to any desired height, while the chandelier remains stationary. It is very simple in its mechanical construction, and adorned and beautiful in design, and is one of the most popular chandeliers now before the public.

The parlors, dining rooms, ball room, corridors, etc., require twenty-nine massive chandeliers, each having twenty-five lights, which for superiority of finish and beauty of design can scarcely be surpassed.

A Good Record.

THE CORNELL UNIVERSITY,
ITHACA, N. Y., Nov. 25.

Dear Sir:—It gives pleasure to state that the town clock recently erected here has been running steadily and satisfactorily ever since it was set in motion. In all respects it does a great credit to your establishment.

It keeps time with great precision, and although necessarily more complicated than town clocks usually are for the reason that it has to strike not only the hour on the great bell of the University, but also the quarters on the bells of the chimelins. It has gone on with great accuracy and has fulfilled all expectations in every respect. It is very easily managed, and its workmanship is so perfect that I have no doubt that it will continue to move on to our entire satisfaction for very many years. I remain, very truly yours,

Signed, ALVIN D. WHITE, Pres't.
To ALBION THOMAS, Esq., Pres't of the Seth Thomas Clock Co.

Notwithstanding the rage for antiques many new articles are continually appearing, and jewelers particularly are constantly producing novelties. Among the latest and newest are very handsome necklaces, composed of open chain-work, with Jeannette crosses of finely-chased silver, chainettes of the same form, from which depend a smelling-bottle, fan, etc., and the Jean d'Arle belt, with its flat open links in very fine work.

MILLER BRO'S MANUFACTURING JEWELERS,

11 MAIDEN LANE, New York.

INITIAL GOODS A SPECIALTY!



Manufactory, 47, 48 & 51 Franklin Street,
JAMES W. MILLER. Newark, N. J. ISAAC M. MILLER.

Sets, Sleeve Buttons, Studs,
Collar and Chemise Buttons,
Enamelled, Plain, Engraved and Roman Gold.

Mounted in Pearl, Stone Cameo,
Onyx, Amethyst, Topaz, Coral,
Aco. No.

SHAHER & DOUGLAS,

MANUFACTURERS OF

Fine Jewelry,

11 MAIDEN LANE, NEW YORK.

Factory, No. 355 and 357 Mulberry Street, Newark, N. J.

ENGRAVED & ENAMELED SETS, PINS, EAR-RINGS,

SLEEVE BUTTONS AND STUDS.

SEAL RINGS A SPECIALTY!

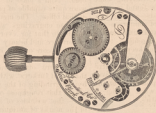
SPECIAL ATTENTION IS INVITED TO OUR

Amethyst, Topaz, Stone Cameo, Incrusted Amethyst,

Incrusted Garnet and Sardonyx Rings.

International Watch Co.

OF NEW YORK.



This cut illustrates one of our NEW STEM WINDING MOVEMENTS, NAMED INTERNATIONAL CO. "D," which we have just received.

It has 5 pairs Ruby and Upper Centre Jeweled; Upper Jewels set in Gold; Ruby Hairspring; Exposed Ruby Pallets; Breguet Hairspring and is Compensation Balance.

We unhesitatingly recommend this movement to our patrons, as being superior in quality and finish to any ever before offered at the price.

SCHWOB BROS. & CO.,

P. O. Box 2310.

No. 173 BROADWAY,

GENERAL AGENTS.

NEW YORK.

Jeweler's Circular

HOROLOGICAL REVIEW.

A Journal devoted to the interests of the Watch and Jewelry Trade of America, and the organ of communication between all buyers and sellers in this particular branch of business.

This Journal will be forwarded to any address in the United States and Canada, for \$1.25 per Annum, payable in advance.

Correspondence solicited from all parts of the country, on subjects pertinent with the aim and object of the paper.

All communications should be addressed

D. H. HOPKINSON, 329 PEARL ST., N.Y.

Our Agencies.

Those who are not as yet our subscribers can obtain copies of this Journal by addressing any one of the following named gentlemen, who have kindly consented to receive subscriptions and advertisements for the JEWELER'S CIRCULAR:

THE PHILADELPHIA WATCH CO., 618 Chestnut street, Philadelphia, Pa.

EARL K. COOLEY, No. 17 Merchant street, San Francisco, Cal.

SIG. ALEX. HERRERA, 20 Muralla, Havana, Cuba.

NEW YORK, NOVEMBER, 1875.

SPECIAL NOTICES.

WANTED.—A function holding order to go to Portland, Me., to see J. A. SEAR, Leggett's Hotel, New York City.

WANTED.—A fine watch, New London, Conn., would like a situation as watchmaker; has had several years' experience, best references.

TO WATCHMAKERS requiring a good timepiece, a cheap Chronometer by the Swiss, RICHARD ALLIOT, 111 Main street, New York.

WANTED.—An honest and industrious Jew, 15 or 20 years of age, able to take time of the watch and jewelry trade one to three years. Address W. F. J., Box 100, Marshall, N. Y.

WANTED.—A first-class Watch and Jewelry repairer, one who is also a good engraver, and has good references. Address or Enquire at No. 1, J. P. Re, Corner Commerce, William & Co. Main street, New York.

A FINE E. Howard & Co. Watchmaker's Register, for 1876, is in the press and as good as new. Address: DODGE, 12, South Broadway, Corner of Nassau, New York.

FOR SALE.—A Wood Case English, A fine Clock (by the English) with a good clock, or trade for a good value. Apply to J. C. MILLER, HENRI & Co., 100 Nassau, New York.

STOCK AND FIXTURES FOR SALE—less than cost. A new and elegant furniture store in West Pennsylvania, 1000 to 1200 square ft. R. CROWLEY, 411 Fifth Street, New York, or J. C. MILLER, HENRI & Co., 100 Nassau, New York.

FOR SALE VERY CHEAP.—One of Hume's patent watches, with a second hand, which has been sold and broken, over 100 times, and is now for sale at a low price. Apply to J. C. MILLER, HENRI & Co., 100 Nassau, New York.

TO DESHIRE to go South I will exchange with some Jeweler residing in New York, Alabama or Tennessee, my house, lot, and stock of watches, clocks and jewelry, the only store in the city, the place, population about 1,000, fertile location and good water, worth to be seen in a town of the same size in the other three States. For particulars address E. W. COLLIS, Portland, Maine.

FOR SALE.—A desirable Watchmaker and Jewelry stock in a city of 100 inhabitants, in the most healthy part of the State, largely of gold and silver, and worth to be seen in a month's sale for more than \$100. For particulars apply to J. C. MILLER, HENRI & Co., 100 Nassau, New York.

TO WATCHMAKERS and Jewelers.—Wanted.—The management of a business, or a Jeweler, or a watchmaker, first-class workman, thoroughly competent in the management of watches and jewelry, and who can work on business, good references, and of business habits. Apply to J. C. MILLER, HENRI & Co., 100 Nassau, New York.

TO DESHIRE to go South I will exchange with some Jeweler residing in New York, Alabama or Tennessee, my house, lot, and stock of watches, clocks and jewelry, the only store in the city, the place, population about 1,000, fertile location and good water, worth to be seen in a town of the same size in the other three States. For particulars address E. W. COLLIS, Portland, Maine.

The Washington Move.

Just after our last issue went to press "war was declared" by the Washington jewellers in a notification to New York houses that the authorities of Washington "had determined to execute to the bitter end" the law as regards the exhibition of samples or sales of goods by non-residents. A fine of \$200 is imposed by the Washington statute for each "offense."

This move is in accord with the general policy of Southern cities, although, except at Baltimore and for some time in Richmond, it has generally been deemed wise to allow the law to remain in a state of suspended animation, from which it was evoked only when some one had a personal grudge to pay off against an individual

traveler. It was a custom more honored in the breach than in the observance. At Baltimore it was evaded by travelers taking their customers down to Washington, and showing their goods to the authorities, who probably at the inspiration of the Baltimore people that this step has been taken in Washington.

Now, of course, it is an open question whether a manufacturer should prefer to do his business through the jobbers or by means of travelers of his own, or by using both systems. The two virtually conflict each other, and it is of course to be considered whether it is wise for a manufacturer house, which desires to sell to jobbers, to push travelers of its own into the field they had expected to supply when they ordered goods. But it is certain that the strength of the jobber as a middle man comes from the service he does, the convenience he offers to the manufacturer on the one side, and the retailer on the other. He may increase trade, but trade does not depend on him.

For him, therefore, to attempt to dictate on both sides, to say to the manufacturer that he shall sell only to him, and to the retailer that he shall buy only of him, is going beyond his rights. As Baltimore and Washington retailers have rights, as well as the Baltimore and Washington jobbers, and if they choose to buy of "bummers," it is their business. We do not say that the manufacturer is necessarily wise in attempting to sell them over the jobbers' heads; that is not the question, just now. The question is, do the jobbers should show the manufacturers their view of the case by fair means and not by foul.

It has generally been understood that freedom of trade between the States, that the citizen of any State should be entitled to equal privileges in any other State, is getting the more precious feature of our nationality. We are by no means sure that cities have any right, under the constitution, to discriminate against non-residents. It is a question of the right of narrow minded as to put the matter to rest. Such a policy, fully carried out, would result in a practical division of the country into counties, and the number of petty principalities, with the complications that harassed Germany before she threw off the bonds.

Fashions.

The shop windows are full of all sorts of novelties in fancy jewelry, among which are conspicuous the collars, and centerpieces, *mignon* sets, fashionable with the Parisians, and beginning to be worn here. The former are a modification in silver and oxidized metal of the original collar, which was made of flat, iron links and fastened in front with a device representing a hand holding a cross. The metal necklaces, collars, here offered, are more comely than the iron ones could have been, and are, furthermore, softened and made attractive by bands of enamel, and by the running through the links. This peculiar arrangement is designed to be worn close about the neck over a high corsage, with a stand-up collar, and is a beautiful *mignon* set, or Joan of Arc belt, as they are often termed, are made after the same fashion and of the same substances as the larger and there are more of them, forming wider and much longer bands. These pass over the waist, to fasten below on the left side, were one end hinge for the accommodation of the necktie, or whatever article of the kind the wearer may choose to attach. New York modistes do not predict for either the collars or belts a very long career, they say, as they soon be past aside with gold and silver braids and other marked novelties for styles less conspicuous. Chains and medallions remain popular, and come in a variety of designs. The cable pattern is in vogue for the chains as is also a pattern of large links, alternating in Roman and polished gold, and inlayed in gold, and tortoise and jet, more or less elaborately worked, and showing unique designs—not seen in the loose necklaces—are worn by the close as they are consistent with comfort, and somewhat after the manner of the metal collars.

Editorial Notings.

A large and thrifty class of country jobbing firms have sprung into commercial existence within the last few years, and are said to be dividing business with the great centers, on a scale that demands attention from the latter if they would hold their own. The rapid and extensive diversion of trade is in consequence of the unreasonable expenses attending the management of business here. A correction can be applied only by selling cheaper than the country jobbers. Expenses here are put down as reaching six, eight, or even ten per cent. of the aggregate sales—a rate fully double what was common before the war, and far in excess of the country jobbers who are competing in this line of business. Store rents outside of the great center are very small, and the salaries force employed is several times less. The question therefore is, what can merchants afford to pay? It is wise to indulge in the expensive and slow establishments now so much in vogue rather than to choose the plainer, less pretentious style from which the modern generation have so widely departed?

There was a clockwork the other day in the lane. A terrible crash reverberated up and down the street, and behold, when the dust cleared away, there was nothing left to look up, the great pillar clock in front of Alex. M. Hays & Co.'s store was gone. There was a good deal of blame cast about, the clock was said to have fallen straight across the sidewalk and smashed "tho smithereens" one of the fine French watches which had been imported from the Continent at the cost of \$2,000. The catastrophe threw the occupants of the store into confusion, but they rallied at once, and with presence of mind formed a human chain, and in a few minutes the valuable goods exhibited in the store window could be removed out of clutch of the crowd attracted by the accident. The clock, however, had been replaced, but the clock—Oh, I should, I should, "the glory has departed."

The resignation of Mr. C. C. Adams, managing agent of the Gorham Manufacturing Company, is one of the chief topics of trade interest, and calls forth numerous expressions of the cordial appreciation of that gentleman from all around the country. Mr. Adams has been connected with the Gorham Mfg. Co. for seventeen years, and his growth from the business of that day to present magnificent proportions has been, in no small degree, associated with Mr. Adams himself. He has been a vigorous manager, and yet his vigor has been so tempered with courtesy and unanimity, that every one with whom he had business met him in the most pleasant relations. He has a very valuable reputation in the trade, and its members will be glad to learn that he is not likely to leave it, although his future plans, we believe, are as yet undetermined.

We have to thank the trade for an increasing support, which justifies us in pushing forward to make the JEWELER'S CIRCULAR a more complete specimen of trade journalism in this country, as is proper in the representation of a leading art industry. We shall commence the seventh volume of this Journal, February, 1876, when it will appear in a more convenient form for binding and reference. We have in contemplation such other changes as will render the JEWELER'S CIRCULAR acceptable to every one in the trade, and will place the journal first in the front ranks of trade journalism. We shall subscribe to the trade with the December issue.

We regret to chronicle the death of Major J. S. Carter, one of the veterans of the trade, which occurred at his home in Newark, Thursday, the 11th instant. Major Carter came into the firm of Carter, Carter, Howland & Sloan, in 1855, and after remaining there a few years, went into partnership with Mr. Durand, under the firm style of Durand, Carter & Co. He retired a few years ago. His death will be lamented by a wide circle.

Elise Magnin, dealer in watches, shipped a box containing \$2,500 worth of those articles by Adams Express Company, for Memphis, and they were lost. The shipper sued the company to recover the value of the property, and the defense was non-liability on account of want of specific notice giving in detail the contents of the box. The case came to trial before Judge Curtis, in the Superior Court, and the main point relied on by plaintiff was that defendant's knowledge of plaintiff's customer having been taken by the company, was sufficient notice. The jury found for plaintiff for the full amount claimed, with interest, and a motion for a new trial, based on alleged inefficiency of evidence, was denied.

The best barometers of City trade are our hotels. When you hear from the spruce young man behind the office that every room in the house is filled it is a sure sign that business is prospering, and that our jewelry, dry goods and hardware merchants are doing a large trade, but when the hotels make no show of life it is a sure sign that business is dead. From all we have heard, business in this city never will falter with our hotels than at present.

Mr. Ernest Sandor, of Chicago, proposes to give a series of lectures during the winter months on the higher branch of the horological art. Mr. Sandor is a gentleman, well-versed in the science, and his efforts should be encouraged by every watchmaker who feels an interest in his profession, and desires to raise it above a mere bread and butter calling.

The number of business failures reported throughout the country is alarmingly on the increase. It is suggested that a law should be passed to protect honest merchants and trades people. They cannot compete against dealers who go into business with the intention of failing and making money thereby.

Trade Cossip.

Campbell jewelry—Election en-arrang. American jewelry trade from St. Louis to Colfax, making 1,100 miles in thirty days.

Mr. Victor Bishop has one of the finest collections of rings to be found in this country.

The rail has opened very auspiciously in the South, and promises to go far beyond expectations.

"Forty cents on the dollar" appears to be the ruling figure now in dilapidated mercantile circles.

The clock for the new Yale chapel will be made by the Seth Thomas Clock Company of Thomaston.

Laugh at Canada as we may, the law for four per cent. loan was snatched up in London, is a big feather in her financial cap.

A tray of rings was taken from the store of Frederick Bernhart, No. 1018 Third avenue, on the evening of the 4th inst.

A ring of the Egyptian pattern, a possession taken from the finger of an Egyptian mummy, which is said to be 1,800 years old.

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The attention of European buyers, heavy shipments are being made to England and Germany.

The discovery of gold has been discovered in Central Russia, and the Muscovite government expect to do Russian business in gems.

Parquetry is the only predominate stone that has been found in serpyllites, and the only one that we are sure exists beyond our planet.

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"Tell Me, Mary, How is 'Woe Thro'?" is the title of a recent story. Give her a pair of diamond earrings, or one of Johnston's chronos and a chance to win them.

"That clock, stranger," said a Michigan farmer, was the best kind of a check-up to six months ago, when my daughter began to have beaux, and now the clock is always two hours slow.

The American Art Journal says that Palmer, the famous sculptor of Albany, N. Y., began his work as a cameo cutter and some of his early work rivals the best carvings of the foreign artists.

A cubic inch of gold is worth \$140; a cubic foot \$322,288. The quantity of gold now in existence is estimated to be \$3,000,000,000, which welded in one mass could be contained in a cube 25 ft. high.

Joseph Goldman and David Jordan, two Jews, who kept a jewelry store at 30 East Broadway, got into a dispute on the evening of election, and settled the question by shooting each other dead.

Miguel Cordova, a Spaniard in San Francisco, has a thousand dollars in all quarters of the globe, representing every nation and age; the most valuable collection in the United States, if not in the world.

Supplines are fancy jewels which have been much used of late. These stones are of a flame color and set in a setting which is very becoming, and have the advantage of costing comparatively little.

The Treasury Department has discontinued the purchase of silver for the present, on account of the high price. It is probable that the operation of the act under which silver is to be deferred until after the meeting of Congress.

A Connecticut news paragraph says that the late John W. Wain was being re-exposed at Tiffany & Co., of New York. This mine was worked by the late revolutionaries by Englishmen, the ore being shipped to England for reduction.

The man who called in at a Newburg jeweler the other day to consult the regulator, remarked, "as he got out paper and pencil, that he didn't intend to have his watch with him, he'd just come to get the watch set down, and set the watch when he got home."

A Parisian lately bought in a small shop for a few francs a string of imitation pearls. A jeweler who called on him expressed astonishment at seeing so valuable a necklace on his little daughter's doll, examined, and found the pearls to be genuine, and worth some 10,000 francs.

A fire at Freeport, Ill., late on the night of the 23d, had destroyed the Freeport Watch Factory. This establishment has been in operation six months, and several hundred men were in the employ of the establishment. The loss on the building and stock is estimated at \$750,000. The fire was caused by an incendiary organ.

One of the most important branches of industry in New York, says the New York Herald, is the manufacture of jewelry. The motive for the last year or two the trade has been dull to the extent of doing nothing, but just now with it, with all the trouble, there is observable an improvement for the better. One of the leading firms there stands, and there is a considerable trade springing up, and there is a prospect of a full trade somewhat better than it has been for some time.

The Jewelers' Association Collation.

The rooms of the Jewelers' Association, at No. 1 Bond street, witnessed an unusual sight Saturday afternoon, the 23d ult. It was a pleasant illustration of the commercial harmony and social good-fellowship growing up in the trade, and an opportunity for the jewelers to meet in person year after year, in fact, until time—and the jewelry business—shall be no more. This was the date of the first annual collation of the Jewelers' Association, at which gathered fifty members and guests of the organization, representing the foremost houses of New York. As the gentlemen arrived, they were cordially greeted by Mr. T. G. Brown, Chairman, and the other members of the reception committee, and found themselves at home at once. After the capital speech, which was served at the table, had been disposed of, to the enjoyment of all partakers, the company were engaged in conversation in groups when the speech-making was precipitated by calls to "Hail" President Seth W. Hale, of the house of Miffland, Hale & Cottle, declared that he never made a speech, but he would delegate Mr. Edw. A. Bartlett, of Central, Bartlett & Wilson, counsel for the Association, to speak for him by proxy. Mr. Bartlett said:

It was fitting on an occasion like the present that your worthy President should be present in person, and I can only account for his strange absence at this time by the fact that this is a day and age of the world when it is not considered the thing for Presidents to be good fathers.

I suppose if the truth were really known, your President is a first-class father, and declines to speak simply to be fashionable.

At all events he has put me forward, totally unprepared, on the theory, I presume, that a lawyer is supposed to have been born talking, and that if you give him half a chance he will run on indefinitely.

I propose on this occasion, however, to agreeably disappoint you, and say just as little as I possibly can under the circumstances.

To be serious, I assure you I appreciate the honor of being invited at this time to the congregate the manufacturing jewelers of the city of New York on having formed an association which will give to them in time what the French say *apoly style* *esprit de corps*—the spirit of the body, or we would say—that end for mutual benefit that pervades all organizations. We see it in the army, at the bar, and it will develop in all effective bodies, and there are found in military, business or social life.

It seems to have been left to the nineteenth century to demonstrate the truth of the old saying, that "in union there is strength."

There can be no doubt that this saying has always been regarded as a truism, but it remained for the men who have lived within the limits of this century to illustrate the wonderful power and influence of organized effort.

We see it particularly in that intangible, immortal entity that is called a corporation—the soulless, yet inseparable to the institutions that as well as our common humanity, rising superior to death itself. Corporations are upon every hand; the land is filled with them. They represent a powerful machine, and they control the destinies of the State.

I venture to assert that no dual co-existence among the Powers of Great Britain wields half the power or controls half the wealth that is represented in one of our great corporations.

The age in which we live is stamped with this genius of organization, it pervades all departments of human activity, and it is the cause of our revolutionary society.

It is for this reason that great pleasure I have with your organization, and I doubt not you have founded here a guild whose record shall be honorable and membership illustrious, and that you will hand it down to your children and your children's children as a precious heritage.

Before I take my seat I desire to thank you for the honor you have bestowed upon my firm in making us your legal advisers in this city, and the best fortune I can wish you is that you may never need our services.

At the conclusion of Mr. Bartlett's remarks there were, of course, loud cries for "Dodd" that "would not down." Mr. David C. Dodd, of Dodd & Hedges, found himself compelled to leave, or to rise, to public opinion, and said:

Members of the Association.—I might wish to follow the example of your President and call upon one of the gentlemen near me to speak as my proxy, but I would be ridiculous did I do so. I give you one to thank you, on my behalf for the kind invitation which has brought me here to-day. I can hardly express the sincere appreciation by the gentleman who has preceded me, and congratulate him for having secured as his sole advocate any man who may safely follow, as long, at least, as it tallies with the sentiment which has been expressed. This gathering is a decided improvement upon many to which I have been invited, and for the few minutes, it is a little more congenial to discuss sales than supplications; cream than compromises; truth than failures.

I see in this gathering a promise of good, bringing together in this social manner men engaged in the same branch of business, and enabling them to see that they have common interests. I am glad the day is passing away in which men seek to consult only their individual interests. We have necessarily personal plans and privacies pertaining to our individual persons, these constitute in part our capital and secure success. But we are learning that with separate interests, we must have common and united interests which we cannot ignore, and which we would not if we could. We are learning that we must have common interests as business men may freely and honestly interchange views upon matters of common interest, and by so doing, all may be benefited.

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There is neither strength nor wisdom in the selfish motto, "Every man for himself," and I am glad that as a trade and more nearly united, we are learning that with separate interests, we must have common and united interests which we cannot ignore, and which we would not if we could. We are learning that we must have common interests as business men may freely and honestly interchange views upon matters of common interest, and by so doing, all may be benefited.

And allow me to say that as an association we have been built, from the development of this higher and truer standard; and I know that I express the honest feeling of those who are not members of your association, who say that neither rivalry, jealousy nor unfriendly criticism can do over our the business and that feeling which exists between those who are and those who are not members of your association, and that individuality collectively you have better lost wishes. Thanking you again for your kind hospitality, I take the liberty of calling on your esteemed friend Mr. Olmsted, who I know will favor us with some remarks.

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(Continued from Page 234.)

Mr. McFuzee admitted all that this correspondent advanced concerning the handling of fuzee watches by "botchers," but he maintained that a fine going-barrel watch was just as liable to be damaged in the hands of careless or incompetent workmen, as a fuzee watch could be. Very few men were competent to develop the isochronism of balance spring to its fullest perfection, but a great many were able to destroy it, and the isochronism of the hair-spring was all that a going-barrel watch had to depend on, to make it run even approximately the same as a good fuzee watch. Mr. McFuzee denied the assertion that the same watch would run equally well with the going-barrel as it would do with the fuzee, but was perfectly willing to accept the assertion as truth, if he saw the experiment tried, or even on the testimony of a number of reliable men who had seen such a trial.

FUZZE VIBRATES GOING-BARREL.

The following was the next communication on the subject that was read:

Gentlemen of the Horological Club:

As though the "Puzzles" seem to be in a decided minority in this struggle on the going-barrel fuzee question, I hope you will not think we are scared or meek. We are content to wait until the justice of our cause.

But I venture to trouble you with a few words on a point that has been brought up. Mr. Fritz says, very truly, that it is more trouble to isochronize a hair-spring in a going-barrel watch, because more is required of it than from a spring in a fuzee watch. Mr. Sandor, however, seems to question that, and claims that a spring is isochronized in a fuzee watch its isochronism qualities are "not supposed to be used," and considers it very singular to go to all that trouble to no purpose. With marine clock movements, the case might be. Mr. Sandor suggests; but in pocket watches these qualities are used, even in those having the fuzee and chain. For the constant jarring and shaking which they receive by carrying in the pocket are continually changing the vibrations of the balance. This effect results of course with both classes of watches, and we may consider it safe to say that it causes a change of one-half turn greater in less. If the ordinary extent of the vibrations is one turn in the fuzee watch, the carrying will sometimes make the balance vibrate one and one-half turns, and at other times would reduce the vibration as to one-half turn. As this effect is continually being produced, it will be seen that the isochronism of the spring is necessary, and is used in the fuzee watch.

But how is it in the going-barrel watch? Making that it is as perfect as the admirer can grant, the large vibrations will be one and one-half turns, when first wound, and the small ones, two-quarter turn, after running 24 hours, and still less at the end of 36 or 48 hours. Then the effect of carrying in the pocket will be increased the small vibrations to one-quarter turn, and increase the large ones to two turns. This is a very different range of vibrations from the one that the going-barrel party have so much to say about. They claim that they can isochronize a spring for a range of from three-quarters turn to one and one-half turns but can they do it for a range of one-quarter to two turns? Who believes it?

But that is not all. When the vibrations are reduced to one-quarter turn, the watch is very likely to stop, and even if it does not stop entirely, the time is seriously interfered with. And when the vibrations are increased to two turns, not only is the limit of isochronism passed, but we probably have oversteaking, etc., which affects the rate of the watch and causes irregular running, and frequent stoppages.

The only precaution of all this is to confine the range of vibration within as narrow limits as possible, by means of the fuzee and chain. Even then, carrying and other accidental vibrations will cause a range as wide as the spring can be isochronized for, and as wide as can be allowed without rendering a uniform rate impossible. But in a going-barrel watch, the naturally wide range is extended by carrying that rather increases vibrations; and a true and uniform rate is possible, in the pocket.

For these reasons the test proposed by Mr. Fricker would not answer at all. The only correct test is by practical use, by carrying in the pocket for a length of time that will bring into action all the causes that will extend the limits between the largest and smallest vibrations, such as the oil drying up and getting thicker, dirt, etc. Take a dirty going-barrel watch, with its vibrations reduced very small, and will further reduced by carrying, and what chance is there for it to compete with a fuzee watch equally dirty? None at all. Any test should extend through the full time that a watch can reasonably be expected to keep time without cleaning, not less than two years. The watches should be of the same grade and equally well finished, carried in the pocket and subjected to precisely the same treatment, compared daily with the standard time, and the variations set down. That was not a fair test, I don't believe any going-barrel man dares to do it. I tried, I for one will abide by the result, whatever it may be—and it can only be one way. In the meantime, I am, as ever,

AN OLD FUSZEE.

Mr. McFuzee, in the name of all the "Fuzzies," thanked "Old Fuzee" for this

timely and convincing argument in defense of the grand old principles which certain iconoclasts would, under the name of progress, try to break down. "Oh, progress!" exclaimed Mr. McFuzee, for the second time in this discussion, "in thy name how many errors have been committed."

The following communication was the next submitted:

ADMIRING BRITISHER TO THE RESCUE.

Seretary of the Horological Club.
I write to encourage "J. R." in his noble defense of the fuzee and chain. His claims of the wisdom and security in his old style and advantages may seem like boasting, to workmen in America who have no personal knowledge of them, and may not be very palatable, but they are every word the truth. And I have no a doubt but "J. R." himself is far superior as a workman to those who ridiculed his letter so flippantly, and dismissed it so cavalierly. Let "J. R." understand that his countrymen here admire and applaud his course, and back him up in his position. We hope that he will keep up the contest, unswerving though it may be. A true "Johnny Bull" never surrenders, and an English watchmaker should never desert the fuzee, which is the basis of the English system of watch-making. We are proud of, and we point to the records and reputations of our English time-pieces the world through, as a justification of our pride and proof of the superiority of our system. No nation may prefer the "cheap and nasty" if they like, but we English will stand by the fuzee and chain. For it is the glory of craft, and of our nation, and we are bound to defend it. It is the glory of the watch, the glory of the English nation, and of the watchmaker himself, like "J. R.", "years for the right."

Mr. Walham was of the opinion that "Britisher" had advanced nothing new on the fuzee and going-barrel question, which he maintained was the only subject before them for discussion.

FUZZE AND GOING BARREL CONTROVERSY.
The following communication was next in order:

Gentlemen of the Horological Club:

After reading and studying the proceedings of your Honorable body on the fuzee and going-barrel controversy, I am greatly pleased to see the pressure on this subject further than to throw out a few suggestions. Several of your members, and also many of your most talented and experienced members, have, for a number of months argued two sides of this question at considerable length, and yet, in my opinion, there are many important points connected with this controversy which has not yet been considered.

So far as I am aware, all the different methods of applying a spring as a motive power for watches and clocks, has never been fully discussed by any Horological writer in any language, and I would like very much to see some competent person produce a concise treatise, or even an essay on this most important subject. Such an essay, or concise treatise, that would exhaust the subject in all its bearings, and give a candid and unbiased account of the mechanical, and also the economical and practical value which belongs to the various methods of using a spring as a motive power in clocks and watches, whether they be regulated by a pendulum or by means of a balance and balance spring.

Could not your honorable body use its powerful influence in making the preliminary arrangements for a competitive essay on this subject. Let the competition be open to all who are able to express their ideas in the English language, and as an inducement, let some substantial equivalent be offered to the successful competitor. Trusting you will give these suggestions your early consideration, I remain yours respectfully,

CLYDE.

Mr. McFuzee was greatly in favor of the suggestion offered by their correspondent. Such a treatise, he said, was much wanted and, if written by men who were conversant with the whole subject, he felt sure that many false notions would be exploded. Mr. Horologe was also in favor of the suggestions made by "Old Clyde," but at the same time he was of the opinion that their Honorable Body had already too much business before them to give the idea the attention it deserved.

Mr. Chalkbrusker considered that what

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they did not know already on the subject was not worth knowing, and what they could not find out was not there. He moved that all further discussion on the fuzee and going barrel question be dropped from that minute, henceforth and forever.

COMMUNICATION FROM MR. FRITZ.

The following communication was then submitted:

Gratitude of the Horological Club.

I was agreeably surprised to read in your proceedings of last month, that I had been elected a member of your Honorable Body. Please accept my heartfelt thanks for the compliment, and my assurance that I will endeavor to contribute, in some slight degree, to the interest of your meetings,—although I think seems almost hopeless, considering the many able men like Messrs. McFuzze, Uhrmacher, Waltham, Horologer, Clerkenwell, and others, already in the ranks. I regret that my opinions on the raging fuzee controversy have displeased some of your number, but trust that we may harmonize personally, even if we differ in our beliefs.

As it seems so difficult to arrive at any satisfactory conclusion on this question,—every man adhering firmly to his own views, allow me to offer a suggestion: how would it do to have a prize essay on the comparative advantages of the going barrel and the fuzee watch, and thus give every one a chance to state his position and defend his reasons and proofs in detail?

It is evident that there is a wide spread interest in the subject matter of these discussions, and this plan would draw out essays from many good judges and strong thinkers, who would not undertake to express and defend their ideas within the limits of a letter to the Club. The going-barrel party being in greatest numbers, perhaps it would be well to offer the prize for the best essay on the advantages of the going-barrel watch over those with the fuzee and chain; then let our favorite friends try their hand at meeting the issues, or write an essay from their own stand point. But if the idea strikes you favorably, the details can easily be arranged. I merely throw out the suggestion as a way of ending the great fuzee war.

C. E. FRITZ.

Mr. Horologer then rose and said that many of the ideas expressed in this communication agreed precisely with those expressed by "Clyde," but it was no uncommon circumstance for two different and distinct persons to take the same view of a subject, and he had no doubt that there were many others that entertained the same opinion. As regards himself, he was of the same mind as Mr. Fritz, and he was willing to assist the project he proposed all he could personally.

Mr. Chalkbusher had no objection to a hundred persons writing their fingers off on fuzee and going barrels, provided they did not trouble their Honorable Body any further. He begged leave to propose for the second time that the whole question be dismissed.

A number of members favored the proposition to drop the question, at least for the present.

Mr. McFuzze was perfectly willing to give way to the desire of a majority of the members, but at the same time he thought that before dropping the subject, they should, as a club, express their opinion on the merits of the fuzee and going barrel either in the form of a resolution, or otherwise.

* The question of time for expressing such opinions was then directly contested: one party wished to postpone it indefinitely, another party, in their hot zeal, insisted on framing resolutions and voting on them at once. While those who occupied the golden mean, advocated abundance of time before coming to a final conclusion.

Mr. Chalkbusher thought there was no use in making old hens out of themselves any longer by sitting in a room with a cold stove, diverting away hours they might be devoting to other purposes. He moved that they at once adjourn and let both fuzee and going barrels go to the North river, or over into Jersey, or any other place outside the country.

At this juncture, the chairman rose and spoke of the necessity of reaching some decision on this fuzee controversy at the

earliest time possible. He reminded them of the fact, that of late, much of their time had been devoted to its consideration, and many other important matters which had been crowded out from time to time, were now requiring attention. He thought some opinion might be expressed to-night. It was true the room was cold and many of their number showed more or less signs of fatigue, yet these were difficulties which could be relieved. They might retire for refreshments and, while they were doing so, he would remain behind and make a new fire in the stove. No proposition that was ever laid before this Honorable Body with such a hearty, cordial and unanimous approval. The proposition was acted on at once without one dissenting voice, and their honors at once retired for refreshments. And yes, who may incline to scoff at our Horological Club, and measure it according to the common standard of your own social, literary or scientific gatherings, know full well of the peculiar workings of our club and its thoroughly democratic constitution. Where can you find a parallel to the self sacrifice and devotion displayed by the president in remaining behind to light a new fire in the stove, while the ordinary members were engaged in the necessary duties of refreshing themselves.

ADJOURNED FOR REFRESHMENTS.

The secretary did not remain behind to assist the president in making a new fire in the stove, but went along with the refreshment party and conducted them to a restaurant where they were soon settled around two large tables. The lordly, high-toned gentlemen of color, who were in attendance, placed a number of bills of fare on the tables, and waited drowsily to receive their orders. The secretary thought that they should have oyster-stews.

Mr. McFuzze was of the opinion that there was nothing like beefsteak for strengthening and fortifying them for the duties that were soon to follow.

The Adjuster of the French-School opposed the beefsteak proposition; he assured them that men were known to have become intoxicated from eating beefsteak. He considered the fish fry, or some other form of brain food was the correct thing to indulge in on the present occasion.

Mr. Chalkbusher did not desire to eat anything. He only wanted a little something, but that little must be strong.

A general diversity of tastes, which is nothing uncommon among great men, soon became apparent, and it was useless to try and persuade all to refresh themselves in the same manner, each individual ordered what he thought best, and this sensible conclusion was arrived at mainly through the efforts of Mr. Horologer.

The Adjuster of the French-School disclaimed to pander to the tastes of men who did not know what was good for them. He insisted that they should all eat brain food heartily, so as to prepare them for the coming work of the evening, but, as has already been stated, each individual took whatever he desired for himself.

Full justice having been done to the various viands, liquid and solid, spiritual and phosphoric, which were spread before this distinguished body, they hung up the bill for the whole amount, and retired, each individual being armed with a wooden toothpick. It may be a trifling circumstance to report, but it is nevertheless a fact that those members who had not partaken of any solid food, were the most conspicuous in flourishing this useful little instrument.

BUSINESS RESUMED.

A cheerful fire greeted their Honorable Body as they entered their usual council chamber, and they immediately set to work to express some opinion on the fuzee versus the going barrel question.

Mr. Waltham proposed the following motion:

That it is the opinion of this Honorable Body that a fuzee in a watch is unnecessary.

Mr. McFuzze at once arose and moved as an amendment:

That it is the conviction of this Honorable Body that teeth placed on the barrel of a watch is unnecessary.

Mr. Horologer then rose and asked if Mr. McFuzze was in earnest in making such a motion.

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Mr. McFuzee promptly replied that he was in dead earnest, and explained that, as a really good watch could be made without a fuzee, that teeth placed on the barrel was altogether unnecessary.

The chairman interferred at this stage and said that if they were to adopt this style of argument no conclusion could ever be reached.

Mr. McFuzee assured their worthy chairman that he was as anxious to arrive at the right conclusion as any one could be. If Mr. Waltham would alter his motion so as it would refer to common watches only, he would withdraw his own motion and second Mr. Waltham's.

Mr. Waltham refused to alter the motion he had originally made.

Mr. McFuzee then delivered an earnest and ingenious speech. He argued that although the motion was altered to refer to common watches only, it did not in any way compromise the convictions of members in regard to the utility of the fuzee in the watches. And after considerable amount of skirmishing in regard to the definition of a common watch, Mr. Waltham consented that his motion being altered to read as follows:

That it is the decided opinion of this Honorable Body that a fuzee and chain is entirely unnecessary in a watch.

Mr. McFuzee at once rose and seconded the motion, which was passed without one dissenting voice.

Mr. McFuzee then offered the following motion:

That while this Honorable Body considers a fuzee to be superfluous in a common watch, it is in their opinion that a greater regularity of performance is obtained when a fuzee is used in a fuzee watch.

Mr. Horologe had great pleasure in seconding this motion. He had been absent in the country while the principle portion of this discussion had been going on, and had not taken the part in it he would have liked to do. He was strongly believer in the necessity for a uniform transmission of the motive power in a watch when very accurate performance was required.

And now the deliberations became heated. The Anti-Fuzeeites claimed that the Fuzeeites were not sincere in their support of the first motion. They were in favor of the motion for the sole purpose of obtaining an opportunity to defeat its purpose afterwards. The Fuzeeites denied that they had stooped to connivance. They never had at any time insisted that a fuzee was a necessity in a common watch. All they contended for was, that in fine watches, better results could be obtained with a fuzee than without one. That was the precise position they occupied, and they meant to defend it to the last. The Anti-Fuzeeites maintained that the principal arguments which had been brought forward on the subject during the past number of months, were all in their favor. While the Fuzeeites could not obtain all the arguments which amounted to anything were on their side. And so the two parties continued to wrestle till the chairman saw fit to stop the contest. He said that the sense of the meeting should at once be taken on the motion which was before them.

Mr. McFuzee proposed that the vote should be taken by ballot. The Adjuster-of-the-French-School had conscientious scruples against secret voting. The secretary did not deign to express any opinion, but remarked that the annals of their club showed nothing but voting open. A number of members then expressed their views on the subject. The most unparliamentary manner of the chairman had to agree to interfere to restore order. "Gentlemen," says he, "I need scarcely remind you that this is not an Alderman's meeting where all are equal. If the ruling taken in that manner, as it is equally fair to all parties."

Thirty-six slips of paper were then prepared as nearly alike as possible, and handed round the meeting. Each member wrote his vote on the paper as he saw fit, and the papers were about to be de-

posited in the chairman's hat, but some person objected to the use of a hat on the grounds that the loose lining might possibly lead to mistakes. Finally their brand new letter box was used for the purpose. The result of any political contest was at no time ever so anxiously awaited as the result of this balloting was. The Anti-Fuzeeites were manifestly depressed, and were an anxious expression. The Fuzeeites were a look of unflinching resolution, the resolution born of honest conviction. When the result of the ballot was announced, disgust suddenly settled on every countenance, eighteen years for the motion and eighteen were against it.

AN APPEAL TO CHANCE.

One member, Mr. Ruby Pin, then arose, and in a beautiful and tender appeal, announced his determination, that inasmuch as agreement seemed impossible, to give up the job as hopeless, in fact, to abandon the battle so long and so desperately waged, as a drawn game.

Mr. Chalkbrusker next got up, surveyed his puzzled companions, and addressed them as follows: "Look you here, don't let us be a parcel of old liens any longer. What is the difference anyway? Who cares which way it goes? Now, Waltham, you are the head of the Anti-Fuzeeites. McFuzee, you are the leaders of the Fuzeeites. Let each of you take a cent and toss it up and settle it in that way. The best out of four has it." Mr. Waltham seemed to take the idea but hesitated. Mr. McFuzee was of the opinion that a settlement in that manner might detract from the dignity of their Honorable Body. "Heads or tails," exclaimed Mr. Chalkbrusker. "It is unusual and hardly proper," said Mr. Horologe, that "questions of so—" "Heads or tails?" repeated Mr. Chalkbrusker. "Heads," feebly responded Mr. McFuzee, in a manner which indicated that the reply was wrung from him by the heat and the impetuosity of Mr. Chalkbrusker. "Now, Mr. Waltham, you commence the tossing." Mr. Waltham then took a nickel and tossed it up four times, and the result was one head and three tails.

It was now Mr. McFuzee's turn to toss. He hemmed and hawed, and took a long look at his friends. He saw the decision threatened to impair the appeal to chance. "Oh, chuck her up. Who's afraid," said Mr. Chalkbrusker. "Oh, what are you gining at, old Fuzee? Tip the nickel. Hit her. Give her an easy toss. Up she goes, and down she comes. Four times and the gig is up," exclaimed Mr. Scroopsgood. The location of Mr. McFuzee departed. He brushed it away as a loose brush off a gad fly with his convenient tail, then he tucked up his trousers, took the nickel, and tossed it up. It came down heads. Again he tossed it with the same result. A third time the coin was thrown up, and it came down heads. The excitement had now reached its height. The next throw was to decide the question. The honorable members stood two deep around the council table. Not an eye wandered from the coin, which lay in Mr. McFuzee's steady hand. Not a word was uttered, for every one felt that the decisive moment had arrived, and Mr. McFuzee's steady hand, which lay in the hand of the clock pointed to 3:23 a. m. It was a one-day, Connecticut clock, valued at \$125, wholesale. And now Mr. McFuzee gave that nickel a toss up, and sent it sharp against the ceiling of the council chamber, whereon it left a mark that will remain as long as this new historic building stands. The nickel fell with a clink on the table and it turned tails.

There were blank faces in that room. The staring eyes of the body of great men who undertook to settle the fuzee controversy were fastened on the table. On every side was the word written in their lexicon, and misreading was the only result of their long deliberations and intentions. Mr. Chalkbrusker, who had tried to break the silence, "Come," says he, "we are nothing but a lot of old liens anyway, let us go home."

"Taking Advantage of the Situation."

Size 13x17 inches; Printed in 13 Oil Colors.



"Taking advantage of the Situation."

The above cut represents the most popular and north-provoking picture ever issued in the interests of the jewelry business. The old gentleman is so absorbed in viewing the merits of the season, that he is perfectly unmindful of the fact that a little too-black "Taking Advantage of the Situation" by stealing a smoke. The chemo di-plaer very much more character in the countenances of the figures than it is possible to attain in a wood-cut; in fact, all the accessories are very much more finely carried out than in a possible illustration.

This picture has done more to attract attention to my place of business, than 15 years of persistent advertising had done, and the steady increase, month by month, in my business this year over last year, I can trace to no other source. In saying this I do not refer to the side of the picture, for that I keep separate and distinct from my business, but my cash sales have steadily increased every month over the corresponding month of last year, amounting in the aggregate to several thousand dollars more.

There is no reason why one jeweler in each town and city in the whole country cannot reap the same benefit from these pictures, for they are furnished in large quantities at a low price, with the name of each jeweler printed on the chrono, the same as my own name and address. With the name and location printed on one, and given to a friend, he will be a free advertisement for many years to come; and if placed in hotels and other public places, they will do more good than ten times their cost spent in ordinary advertising, and if you keep one handsomely framed in your window, it will be seen to attract more attention than anything you ever had.

In order to increase the sale of these pictures, I have adopted the following plan:

Having a pair of diamond earrings, weighing over 20 carats, which cost to import about \$4,000 in gold, I propose selling 4,000 of these unique pictures at \$2.00 each, and give the diamonds to the 4,000 purchasers of the pictures, and as I cannot legally sell numbered tickets, I have entered in a book numbers from 1 to 4,000, and on the reception of each name with \$2.00, I will enter them as they arrive, and will immediately mail a Postal Card to each one, with their number in the book.

When all are sold, I will place the diamonds in the hands of D. H. Hopkinson, Esq., Editor of the Jeweler's Circular, 200 Pearl Street, and he will be kindly requested to conduct a large committee, and they will decide in what manner the ownership of the diamonds shall be determined upon.

Whether I will carry out this matter in the end is the main question with every one who sends me \$2.00. That I will do so, I think will be doubted by no one who reads the following:

We, the undersigned, having known Mr. J. H. JOHNSTON for the last fifteen years or more, have no hesitation in saying that we believe that any matter of business undertaken by him will be carried out to the letter, and that any statement made by him may be implicitly relied upon.

WHEATLEY, PARSONS & HAYES, 2 Maiden Lane. VULCANITE JEWELRY CO., Jas. V. Schoemaker, 151 Broadway.

SMITH & HIGGINS, 1 Maiden Lane. WATKINS, STEEL & CO., 2 Maiden Lane. WATKINS, STEEL & CO., C. E. Birkley, Pres't, 181 Broadway.

DON & HIGGINS, 8 Maiden Lane. CARLIS, HOBKINS & SLOAN, 1 Bond Street.

MENDELSON SILVER PLATE CO., Chas. Carter, Pres't, GUTHRIE M'Y'N CO., 1 Bond Street.

And I do not hesitate to refer you to any one else in the trade here in New York, by the most of whom I am well and favorably known.

By putting 20 cents extra I will put your name in place of mine, as seen in the cut, and for 25 cents additional will inscribe it, ready for framing. And if you order 5 or more, I will print your name and mention them free of cost.

We are often asked: "When are you going to get this thing off?" we hope within a month, but name and one or two before Christmas, for the very latest.

We are receiving orders from all parts of the country, and quite as many orders for lots of 5 and 10, as single orders, and have no doubt but that the holidays will find us with the whole number sold. And we beg leave to suggest that if it be in your mind to order one or more just before Christmas, do not wait till then in sending in your order; now is the time to order to insure its being filled before Christmas.

A liberal commission will be allowed for selling them, if ordered by the dozen.

J. H. JOHNSTON, Watchmaker and Jeweler,

No. 150 Bowery, New York.

Dealers who are not as yet subscribers to the JEWELER'S CIRCULAR, the organ of the Jewelry trade, on remitting to this office \$3.00 will be entitled to the above picture, and a copy of the JEWELER'S CIRCULAR mailed regularly each issue for the term of one year from date of subscription, and not wait till then in sending in your order; now is the time to order to insure its being filled before Christmas.

D. H. HOPKINSON, Editor, No. 200 Pearl Street, New York.

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No. 520 Market Street,
SAN FRANCISCO.

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OF EVERY DESCRIPTION.

Would call especial attention to their new

Patent China-lined Ice Pitchers.

27 Factories, TAUNTON, MASS.

These Pitchers are made of the finest quality of white metal, heavily plated with silver. They are finely engraved and chased in a great variety of decorations. The linings are of fine stone china. The top is secured to the body of the Pitcher in such a manner that can be easily detached and the lining removed for cleaning or other purposes.

Many improvements attained are noticeable in these Pitchers. Water and ice standing in them do not come in contact with any metal whatever. They are perfectly clean, and easily kept so. They are perfectly free from all odor or rust. Lemonade, beer, milk, etc., may be kept cool in and drunk from these Pitchers without endangering health. There can be nothing cleaner or purer for holding liquids than pure, white china. There is no possibility of leakage. The construction of the Pitcher is such that the linings can easily be replaced at a very small cost.

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OF STANDARD REPUTATION.



Fancy Musical Goods,

Specially designed for the requirements of this market.

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(PATENTED.)

M. J. PAILLARD & Co.'s INTERCHANGEABLE AND SELF-ADJUSTING CYLINDERS for increasing the number of airs and rendering the instrument capable of many changes in tunes and melodies (with but a slight additional expense.) This invention is a marvel of mechanical ingenuity, and has achieved a wide spread reputation.

THE NEWEST FEATURE

is the GRADUATING SCALE, an improvement recently introduced and patented by us. This invention consists in combing the cylinder with two or more segments of combs of graduating notes, the vibration of which are of similar pitch, producing a clear and distinct harmony of sound never before attained in the old style of boxes.

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Skilled workmen, specially educated in intricate repairing, are employed in our establishment, and all damaged or injured instruments intrusted to us for repairs will be put in workman-ship like order at a moderate charge.

Buyers coming to New York are invited to examine our stock—the largest in the city.

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SPRING TRADE, 1875.

AIKIN, LAMBERT & CO.,

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Have in stock, and are manufacturing a large assortment of first-class Gold Pens, consisting of long nibs, short nibs, fine pointed, coarse pointed and angular or oblique pens. All of which will be furnished with soft, springy, or hard temper as may be required.

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Assortments arranged in handsome trays, and pen signs furnished to regular agents. Being disposed to meet liberally with liberality we have originated and gotten up Metal Show Cases of sizes suitable to the wants of our patrons who order sufficient goods to make a creditable display. Others are compelled now to follow our lead, acknowledging us as "Leaders of Fashion."

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We are also manufacturers and dealers in solid gold and rolled plate jewelry all of which being intended for the Jewelry Trade, proper will be found reliable.

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Reliable.
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New goods sent on selection when required.
Watchers have been introduced for some 10 years and numbers of them have been sold. By inviting criticisms from the several master-minds in America, as well as in Europe, we have now a watch perfect in its proportions, reliable in its actions, made of the best materials, and in short, the best watch the money offered for sale; energetic competitors will endeavor to force their goods that the Paul Breton's may be displaced, but the testimony of those who have experimented is, that for assured continued excellence the Paul Breton is true watch.

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of Loche, have just sent out an invoice of their movements, gotten up under our direction, with *Edel's Patent Regulator and Patent Safety Barrel*. Something entirely new.

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are three quarter-plate in style and full-jeweled; have tempered hespring; good balances, and are Standard Watches at low prices. Will have diamonds, hands, springs, etc., for repairs.

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In ordering Name Keys please write name and address plain so as to avoid mistake.
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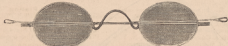
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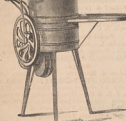
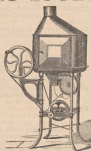
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Kroemer, P.—Clocks and Regulators of every description. No. 4 Courtland street, N. Y.

United States Clock Co.—Henry Tordun & Son, 3 Courtland street, N. Y.

Waterbury Clock Co.—M. Bailey, Treasurer, Mantis and Johnson, No. 4 Courtland street, N. Y.

Wood, James—Manufacturer, Importer and Dealer of Fine Regulators and Clocks of every description. 6 Courtland street, N. Y.

Corals and Coral Jewelry.

Erlicio Bros.—Established 1869—Importers of Coral Jewelry. 19 John street, N. Y.

Lawson & Granbery.—Manufacturers of Coral Jewelry. Coral Jewelry, Coral Jewelry, refurnished and repaired. No. 63 Nassau St., N. Y.

Cameo Cutters, Etc.

Bonnet, L.—(Successor to Bennett & Bonnet.) Cameo Likenesses, No. 290 Broadway, New York.

Charms & Gold Watch Keys.

Rupp & Held.—Manufacturing Jewelers, Charms and Gold Watch Keys, with French and English Hatches, a specialty. 15 John st., N. Y.

Diamonds.

Bernhard, A. & Co.—Manufacturing Jewelers & Importers of Diamonds. Fine Jewelry, &c. 109 Broadway, Gilsey building, N. Y.

Blooming, E.—Importers of Diamonds, No. 182 Broadway, N. Y.

Fera, Henry—Importer of Diamonds, No. 9 Maiden Lane, New York.

Merch, Jacob—Importer of Diamonds, Pearls, Opals, and Precious Stones. Diamonds in pairs a specialty. No. 25 Maiden Lane, N. Y.

Nussbaumer, R. Aug.—Importer of Diamonds, No. 5 Maiden Lane, New York.

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Bornemann, Louis—Manufacturer of Diamond Jewelry. Brass a specialty. Superior finish and original designs. Send for Price List of Single Articles. 109 & 171 Broadway, N. Y.

Smith & Hedges—Importers of Diamonds Exclusively, and Manufacturers of Fine Diamond Jewelry. 1 Maiden Lane, or Broadway, N. Y.

Taylor, Olmsted & Taylor—Importers of Diamonds and Diamond Jewelry. 3 Bond street, N. Y.

Diamond Settings, Etc.

Friedel, S.—Manufacturer of Fine Jewelry, and Diamond Setter, 31 John street, N. Y.

Enamellers, Etc.

Orr, Jas. C.—Enameler on Fine Jewelry, Flowers, Birds, &c. Enamelled in colors. Band Bracelets (a specialty). 77 Nassau Street, N. Y.

Dials, &c.

Casner Brothers—Manufacturers of Enamelled Clock and Meter Dials, also Watch Makers, No. 43 John street, New York.

Gold, John—Successor to J. M. Late T. Gold, Enamel Watch Dial Maker, No. 81 Nassau Street, New York.

Engravers and Die Sinkers.

Arley, William—Designer & Engraver of Watch Cases, Jewelry, &c. Monograms, Crests, Lettering and Engraving. No. 28 Nassau street, Room N. Y.

Dobley & Wood—Engravers & Engraving of Precious Stones, 109 & 171 Broadway, Room 25, New York.

Fackner, Edward—Carver, Engraver and Chaser of Jewelry. Monograms, Lettering. No. 10 John street, N. Y.

Honning, Albert J.—Die Sinkers & Engraver, 21 Centre street, N. Y.

Kroemer, P.—Engraver, Die Sinkers and Designer for Engraving, &c. 14 and 18, Shans and Halls for Rings, &c. 41 Maiden L., N. Y.

Mohl, Robert H.—Engraver and Die Sinker. Steel Stamps for Watch Cases and Silver with a specialty. 42 John St., N. Y.

Park, William—Stone Seal & Cameo Engraver, and Die Sinker. Masonic Devices and Engraving for Inscription. 295 Broadway, N. Y. Room 14.

Schuller, J. Danl.—Stone Seal Engraver, Arms, Crests, Initials and Monograms engraved on Stone Seals, &c. No. 71 Nassau Street, N. Y.

Electro Platers.

Jeanbapt, P.—Gold and Silver Electro Platers & Fine Gilders, Coating Eversen and Gold Jewelry specially. 71 Nassau St., N. Y.

Normann, P. A.—Electro Gold & Silver Nickel Plater. Coating Gold and Silver work a specialty. No. 102 Nassau Street, N. Y.

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Nickel Watch Finishers.

Boynett, E. & Co.—Nickel Watch Finishers and Nickelizers. Agents, Tugwell a specialty. No. 3 Maiden Lane, N. Y.

Fancy Goods, Clocks, Bronzes, Etc.

Hierzka, C. F. A.—Importer and Dealer in French, English and German Fancy Goods, etc. 26, 31 & 33 Park Place, N. Y.

Maguin, V. J.—Grand & Co.—Importers of Clocks, Bronzes, Musical Boxes & Rich Fancy Goods, etc. 632 Broadway.

Le Bonillier, E. F.—Importers of Fancy Goods, Clocks, Bronzes, &c. No. 10 Maiden Lane, N. Y.

Gallery Settings.

Walter, Edward—Gallery Settings & Increased Stones, 12 and 14 John street, N. Y.

Gold Chains, Etc.

Besch, J. & Son—Manufacturers of Fine Gold Chains and Chain Bracelets, 16 Liberty place, near Maiden lane, N. Y.

Pollak & Deyling—Manufacturers of Gold Chains with Patent Safety Swivel Attachment, No. 4 Maiden Lane, N. Y.

Kaufmann Bros.—Manufacturers of Gold Chains and Chain Bracelets, John street, Factory, 723 3d street, N. Y.

Lobnitz, Albert—Manufacturer of Gold Chains of Chain Bracelets, No. 35 Maiden Lane, New York.

Smith, Bernard—Manufacturers of the Celebrated Woven Fabric Gold Chains and Chain Bracelets, 5 Maiden Lane.

Gold Pens, Etc.

Aldin, Lambert & Co.—Manufacturers of Choice Gold Pens, Gold Ballpoint Pens, 101 Broadway, 12 Maiden Lane, N. Y.

Todd, Edward & Co.—Manufacturers of Gold Pens, Penholders, 45, 47, 49, 51, 53, 55 Broadway, N. Y. Factory, Brooklyn.

Gold Rings.

Bowden, Joseph B.—Manufacturing Jeweler, Solid Gold Rings a specialty. No. 11 Maiden Lane, New York.

Ely, W. H.—Manufacturer of Solid Gold Rings of every description. No. 28 Nassau Street, New York.

Hair Jewelry.

Berthard, A. & Co.—Manufacturers of Fine Hair Jewelry with Devere Work. The latest styles. 160 Broadway, or Room 10, New York.

Frankie, H. C.—Late T. Carle's Hair & Coal. Hair Jewelry of every description. Samples always on hand, 165 & 167 Broadway.

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Brown, Ch. E.—Manufacturer of Jewelry Boxes, Trays for Show Cases, &c. 62 Chatham street, N. Y.

Dobson, W.—Manufacturer of Cases for Jewelry and Silverware, No. Nassau Street, N. Y.

Show Case Trays, &c. at the lowest prices.

Leslie, E.—Manufacturer of the best Jewellers' silverware Manufacturers, &c. No. 63 Prince Street, N. Y.

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Jewelry Pins.

Aldin, Lambert & Co.—Manufacturers. General stock of Reliable Jewelry, No. 12 Maiden Lane, N. Y.

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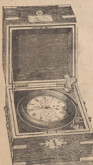
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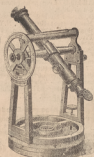
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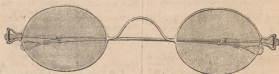
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Practical Hints on Watch Repairs.

By EXCELSIOR.—No. 9.

(141) Lastly, isochronism is obtained by bending one or both ends of the hair-spring into certain shapes, and forming what are termed "terminal curves" or "eyes."

In the helical spring both ends are similarly curved; in the Breguet spring, only the outer end,—the inner end being fastened to a circular collet as in other flat spiral springs. As we have already seen, it is necessary, in order to secure isochronism, that during all the successive changes in the size or form of the spring, while vibrating, its centers should continue to coincide with the center of the axis of the balance. It is therefore desirable, firstly, that it should be so formed that, as it expands, it may do so equally on all sides of the balance, and the contract equally also. If, during any part of its vibration, it springs off to one side, i. e., becomes eccentric, its isochronism will be injured or destroyed, according to the nature or extent of the faulty action. For the eccentricity will prevent a uniform action of the spring, or a uniform effort upon the balance, will cause a pressure of the pivots against the sides of the jewel holes, and the center of gravity of the spring will not be upon the center of the balance axis. Secondly, the stiffness of the spring must increase, during the vibrations, in such a ratio as will cause the balance to perform its vibrations, whether large or small, in equal times, notwithstanding the injurious influences in the way.

(142) All these points are secured by curving the ends of the spring in the following manner. The curved portion being considered by itself, its beginning is where it joins the body of the spring, and its end is the place of attachment to the collet or stud. The beginning of the terminal curve must meet the circle of the first coil of the spring at a tangent, i. e., at right angles to a line drawn from the point of meeting to the center, or, practically speaking, the terminal curve must not leave the body of the spring by an abrupt bend, but bending very slightly at first, curving in gradually more and more towards the center, till it reaches its end, which must be fixed to the stud or collet at a point half way from the outside to the center of the spring, or, as it is termed, at half the radius.

(143) The points of attachment should be firmly fixed, so that the ends of the spring cannot vary the angle at which they meet the stud or collet. It is of no consequence whether the ends of the two curves in the helical spring are pinned over each other or not—they may be in any position which results from the total length of the spring as required by the timing of the watch, although the spring is thought to "look better" when the two ends commence on opposite sides of the center. But the ends should be pinned at an equal distance from the center, and the form of the two curves should not be unequal to each other. But in the Breguet spring, the end of the terminal curve should be in the same radial line as the collet end, to avoid fractional parts of coils, the same as in the ordinary flat spiral spring.

(144) This method of isochronizing hair springs is the best of all, and is adopted by all workmen when it is practicable. The theory of the formation of the terminal curve has been fully explained by Prof. Phillips, of the Polytechnical School of Paris, and his treatise is almost universally accepted as the highest authority on the subject. One cannot but admire the learning and powers of reasoning by which he has arrived at his results, yet, as I shall show, the practical workman may attain the same or even better results by a sim-

ple process of measurement within the capacity of any watchmaker, and the only requisites are a pair of sharp pointed dividers with a pencil for striking circles. These he may get, with a set of drafting tools, as low as \$1.50 although those selling for about \$2.50 are much better. But not one workman in a thousand can follow Prof. Phillips' rules, or even understand them. If, in fact, we may judge by their work, the majority of even practical springers follow no rules, and have no regular system for forming the curve, but simply make them of such a shape as "looks as if it would do." If on trial it does not perform correctly, they lengthen or shorten the curve, and improve it more or less, but seldom give it very close, because they seldom give it such a shape as renders a close isochronism possible. It is not sufficient to have a terminal curve of the proper length, but its shape must also be correct, and proportionate to its length. All these points may be easily secured.

(145) Having made or selected a spring of proper diameter and strength for the balance, you first measure its diameter equally. In a helical spring, measure entirely across from outside to outside through the centre, lay off this distance on paper with the dividers, then set the points to just half this distance, which will be the semi-diameter. If it is a flat spiral spring, take the measure from the elbow to the center as the semi-diameter. Lay the points of the dividers set to the semi-diameter obtained in either of these ways, you mark a circle the exact size of the spring upon a thin flat piece of copper or brass. Divide this circle into quarters by lines through the center, then into eighths, by drawing other lines half way between the quarter lines, as shown in Figs. 2 and 3.

I have given a diagram on an enlarged scale, Fig. 1 showing a half circle only. A, is the center, B C D, the circumference or size of outer coil before bending, which, in this case is divided off into equal parts, and a radial line drawn from the center to each of the dividing points. Next we bisect or halve the line A D, which is called the radius of the circle. The point E, thus found, is to be the end of our terminal curve, or where the acting end of the hairspring is to come, half way between the center and the circle. From this point E, our terminal curve is to sweep outwards till it reaches the circumference, which represents the outer coil of the hair-spring, at the point B.

(147) The proper length for a terminal curve cannot be certainly known beforehand, but it is to be at least half a turn around the center, or 180°, and not even three-quarters of a circle, or 270°. If the spring is quite long, it will be near 180°, but if quite short, or the coils are large and wide apart, it will be not quite 180°. Having decided upon the length according to your best judgment, you mark the distance from D, along the circumference, or in other words, you mark the place upon the outer coil, as B, as we have supposed it to form an arc of just 180°, in Fig. 1. From this point B, the end of the spring at E, our curve must sweep around to the center, drawing gradually nearer to it, and end at the latter point.

(148) In order to mark this gradual approach to the center, we find the point where the curve should cross each radial line. As it will cross ten such lines in passing from B to E, we divide the distance B D into ten equal parts, which is easily done by "picking off" on paper, and set the dividers at that distance. Then mark one such space from the circumference on the first line, at 1, two

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spaces on the next line, at 2, three at 3, and so on to the tenth line, where the tenth space will of course come at E. Now draw a curved line from B through these different points as shown, B, 1, 2, 3, etc., to E, and you have your terminal curve. To mark this curve with the dividers, set the points to reach from 1 to A, then from the leg from A to some point on which as a center the other leg will strike a curve from B to 1. Then set the dividers from 2 to A and strike the curve 110 to 120 and so through all.

(110) In Fig. 1, we have divided the curve into ten equal parts, but the number is of no consequence, except that the more parts the curve is divided into, the more evenly will the different portions of the curve change their shape and merge into each other. But on a small scale, as that of the real size of the spring, it will not be convenient to divide the circle into more than eight parts, as shown by the

FIG. 2

FIG. 3



small cut. Fig. 2, shows a curve extending through three-quarters of a circle, or 270°, and crossing six radial lines, therefore it has been divided into six parts and is marked off as before. Fig. 3, shows two curves; one, B to E, of 180°, divided into four parts; the other, C to A, 225°, in five parts. The same rule applies to the other end of the spring, by simply running the curve in the opposite direction. Fig. 2, shows two curves thus formed. Having clearly marked the curve upon the plate itself, the point of the dividers, as above described, may be used so, as a guide in forming the spring to that shape. Some merely mark the curve with the drafting pen upon a piece of stiff paper, and use as a guide, but it is generally better to use a thin metal plate, as stated, and file off all outside of the curve from B to E, Fig. 1, marking both points plainly, to indicate the end of the curve and its junction with the normal coil, and use it in that form as a gauge. If, on trial, a longer or shorter curve is required, it is but a short job to make a new gauge.

(120) This theory, which may be noticed, is not in perfect accordance with Professor Phillips' theory, which would require it to approach nearer to the shape shown inside of the other, in dotted lines. But, with all due respect to Prof. Phillips, and others who have endorsed his theory as an entirety, I submit to the candid and thinking minds of the trade that a curve formed according to my plan will meet the proper purpose of a normal curve as explained above, more closely than one formed by his theory. I shall not weary the reader with a mathematical analysis of its action and demonstration of the correctness of this claim, but simply challenge the test of a fair practical trial.

(131) Prof. Phillips places great stress upon getting the center of gravity of the entire spring to coincide with the center of the axis of the balance. He supposes that if it does so, and remains there throughout the vibration, the center of the coils will remain there also, and the spring, if otherwise correct, will be isochronal (141). This is true so far as concerns the normal coil, but it is not correct as regards the terminal curves, as explained above. And if not, it is theoretically faulty, according to his own theory. In this respect, therefore, the Breguet spring is then on an advantage over the helical, for when the terminal curve of the former is supported by the stud the remainder of the spring is still in posse. But I think he

attributes too much importance to the center of gravity of the terminal curves. For, in case it was not upon the center of the axis, we could readily rectify the want of poise by the following: let the coil be wide (60, 75), but that would not correct the isochronism of the spring a particle. Again, the isochronism may vary from correctness so greatly, in either direction, even when the spring wire is so slight that the difference of its weight could not be perceived.

Now according to my view of the matter, the shape of a terminal curve should not be treated with respect to its center of gravity at all, but with an entirely different purpose in view, viz., to cause the entire length of the spring to come gradually into action, without any abrupt change of strength, but by a regularly progressive increase of it throughout the whole of even the largest vibrations, while at the same time allowing it to be flexed in either direction without forcing the body of spring out of center, and, incidentally, causing side pressure against the balance-axis. Hence any special trouble about the center of gravity of the curves, except so far as it is accomplished by the above means, is useless if not injurious.

(135) The curve being shaped in obedience to the above requirements, and the foregoing obstacles to isochronal action being removed from appearing, isochronism is then secured by a proper length of the curve, within certain limits. Corner adjustments must be made by altering the length of the main body of the spring inside of the curves. Or, if such change would cause too great an error in the rate, a new spring must be substituted. If the views stated in the preceding section are correct, then I submit to any person capable of working out such a problem correctly, if the shape of curve as drawn by my plan, in Fig. 1, will not secure those ends more closely than the one shown in dotted lines? Will not a spring with the former curves be nearer to the ideal form of isochronism, perfectly balanced in all directions, exerting no side pressure against the balance axis, and remaining concentric therewith whatever the extent of the vibrations may be? The language used in its facts and experience, the only certain proof, will, I think, convince any candid experimenter that it is so.

(154) There is another point in which this curve differs slightly from that of Prof. Phillips. He holds that the end of the terminal curve must strike the circle of the collet at a tangent, a_c , where it is pinned to the collet it must be at a right angle with a line drawn from that point P to the center of the spring. And of course the other end must be pinned in the same way to the stud. I dissent from this assumed necessity, and propose, as more favorable to isochronal action, the angle of the curve will end when formed as shown in my plan, Fig. 1 and end at E the greatest possible variation between my curve and that of Prof. Phillips, because a curve of 180° is the shortest length allowable. The engraver has made the variation at E, Fig. 1, greater than it should be. As the length of the curve increases, the angle of the end becomes nearer a right angle.

(157) The difference, even in a curve of 180°, is very slight, and in practically forming the curve upon a spring can scarcely be perceived. Nevertheless there is a decided difference. The engraver knows precisely what our model is, which we are to copy. Those who adhere to Prof. Phillips' theory, can adopt my method of forming the curves, and follow it according to the tangential theory. It would certainly appear, however, that the difference between the two curves, both in the manner of ending and the form the body is in favor of my plan, as being nearer in accord with the known action of springs in coiling and uncoiling. I may add that I propose, as soon as other engagements will permit, to prepare an elaborate mathematical paper on the action and merits of this curve, for submission to the British Horological Institute, the leading body in the matter of horology in the world, in which I shall challenge criticism of the theories, methods and demonstrations given.

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Tempering Watch Glasses.

Among the many inventions properly attributed to the cavalier Prince Rupert, the result of the ten years of study and research which closed his life, perhaps the best known is that of the drops of hardened glass which bear his name. A Prince Rupert's Drop is made by throwing a little molten glass into water. It is thus suddenly cooled, and the outer portion being hardened while the interior is still expanded by heat, a curious state of tension is the result. The drop is generally round and thick at one end, and drawn out into long slight tail of glass at the other. One may strike the thick part with a hammer without breaking it but let the smallest portion be broken off the tail, and the whole drop falls into a heap of minute fragments and dust. It is a favorite toy with children, and doubtless many of our readers will remember how, in their school-boy days, after they had fully tested the remarkable fact, that, do what one would, there was no use trying to knock the thick bulbs heads to pieces; one vigorous pull would snap off the end of the thin tail of glass, and with a "bang" the long resisting body would fly into countless fragments and grains of dust. And a moment's examination of the shattered remains of a Prince Rupert's Drop is sufficient to show that it is very different from the debris of ordinary broken glass, of which even the smallest grains have sharp little points and edges, so that it pierces and cuts the hand that touches it; meagrely, while the fragments of the "drop" are carefully broken between one's hands are quite harmless. And yet it is only a little melted glass suddenly cooled by being dropped into water. This is all very wonderful. It is puzzled every child since that those of school-boys. But since it was first invented up to the present year it was of no real use to any one. It was a curiosity and nothing more. But a few months ago one of these drops attracted the attention of a French chemist, M. Alfred de la Bastie, of La Bresse, in the Department of the Ain, near Lyons. He noticed that it was only the very thin end of the drop that was liable to fracture, that even then considerable force had to be employed, and that it was almost impossible to break any other part of the tail of the drop, though its thickness was nowhere greater than that of the head of an inch, and much less than that of an ordinary pane of glass. He then began to consider whether it might not be practicable to impart the same hardness to common glass, without destroying its transparency. Fortunately he possessed ample means for research; and after a long course of experiments in his laboratory at La Bresse, he has lately succeeded in producing, by a simple process, specimens of glass perfectly clear and transparent, but so hard and so durable as steel. It gives it the name *verre trempé*, or tempered glass. It has been noticed in some of the English papers under the name of "toughened glass," an epithet which is hardly applicable to it, and certainly does not give any idea of its nature—hardened glass would be a better word. The idea of giving this hardness to glass is not a new one. Rumors succeeded in hardening it by a process of crystallization, but in doing so he made it perfectly opaque, and therefore useless for practical purposes. M. de la Bastie has obtained a really valuable result by a different process, first suggested, as we have said, by the hardening or tempering of melted glass in water in the formation of Prince Rupert's Drops. His object was to find some method of tempering ordinary glass to an equal hardness. It was necessary to discover the proper composition of the bath in which the newly-made glass was to be plunged, and the exact temperature for the process, for if it were too hot it would change its shape, and if it were not hot enough it would break in pieces on being plunged into the liquid. Finally, it was necessary to devise the mechanical means for conveniently working the instrument. The result has been made public by M. de la Bastie to visitors to his laboratory at La Bresse; by M. De Luyne, one of the professors of Paris, to a great scientific reunion at the Sorbonne; and in London by the agents for the invention,

and the *verre trempé* has stood the severest tests. As yet, the details of the process are kept secret, but an outline of its main features has been published by M. De la Bastie. The liquid in which the glass is tempered is a compound of melted wax and resin and various oils, and the ingredients are mixed in different proportions, according to the purpose for which the glass is intended. The bath is raised to a high temperature in a large vat, and in order to prevent its taking fire with the heat, the air is carefully excluded from it. A little distance is an oven, in which the glass is raised to a red heat, so that it is very near its melting point. By means of the oven, a metallic slide, (which, by means of the piston, can be inclined to any required angle), communicates with a table fixed in the vat, and having the same inclination as the slide. As soon as the glass has reached the required temperature in the oven, it is pushed out upon the slide and descends by it to the inclined table in the vat; the depth to which it is allowed to sink in the oil being regulated by a kind of brake, which stops at the proper point. It is allowed to remain there for about a minute, and then a self-acting rake draws it into a metal pan, and the slide is removed from the vat, and the glass is allowed to cool. Some more glass, meanwhile, has taken its place in the vat, and the manufacture of *verre trempé* goes on without ceasing. Thus, the process is a very simple, cheap and rapid one, and is calculated that in this way one ounce and vat, served by three workmen, could, in twenty-four hours, produce 1,000 watch-glasses at a cost of fifteen francs, or about twelve shillings and sixpence. M. De la Bastie has succeeded in tempering glass whose thickness is measured by a millimetre as well as heavy plate-glass. It is as transparent as ordinary glass, but so hard that it can be thrown on the ground without injury. The diamond does not cut it, but it can be cut or pierced with the sand-blast, and engraved with powerful acids. It has, however, a different refractive power from ordinary glass, and the Academy of Sciences of Turin has just begun a series of experiments on its optical properties in the refraction and polarization of light, with a view to its employment in making scientific instruments. The tempered glass is estimated to be about fifty times as strong as ordinary glass, and its fracture is more irregular, a circumstance to which it perhaps owes much its strength. A curved sheet of tempered glass was placed on the ground by Prof. De Luyne, with its concave side downward, a man then stood on its convex surface, and it bent under his weight without breaking, resuming its original form as soon as he stepped off it. Watch-glasses were submitted to the same test, a man placing his head upon one of them, and then throwing his weight upon it without being able to break it. Pines of glass, plates and window watch-glasses, were thrown into the air and fell to the ground without breaking, the lighter pieces of glass rebounding from the floor. "You see," said De La Bastie, "when you ask for *verre trempé* in a shop you can always make sure that the dealer is offering you the real thing, for you can test it by throwing it on the ground. A piece of tempered glass placed over a spirit-lamp close to the flame bore an intense heat without breaking. A glass cup of cold water was placed over a fire, and when the water boiled, without any injury to the glass; and similar experiments have been performed with oil, sulphuric acid, and other corrosive liquids, which at a higher boiling-point than water. M. De la Bastie believes that his glass can therefore be used in making cooking utensils. It was very well, very durable, and other glass instruments in the chemist's laboratory. These are at present considered liable to fracture, and often with very unfortunate results. In a course of careful experiments, the resistance of the *verre trempé* was compared with that of ordinary glass. The plates of glass of the same size, thickness, and of a piece of copper weighing about one and a half ounces was successively dropped upon them from gradually increasing heights. In no case did the ordinary glass resist the fall of the copper from a greater height

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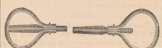
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than three feet, while the *verre trompe* was unbroken even when the fall of the copper was twelve feet. On examining it, metallic marks were noticed on its surface, and the copper was found to be dented by the violence of the blow.

A visitor to M. De la Bastie's workshop, after witnessing this experiment, said jestingly: "Well, Sir, all you have to do now is to roof our houses with glass." The joke suggested of a new test to the inventor. He sent for a roofing-tile. It was broken by the fall of a five-ounce weight from a height of six feet; while the same weight was dropped from a height of over ten feet on a plate of *verre trompe* one-third of an inch in thickness without doing it the least harm.

When this glass is broken by an over-severe strain, it resolves itself into a heap of small fragments like those of a Prince Raper's Drop, and one can plunge with impunity the bare hand into a heap of this vitreous dust. This is a great advantage, as the fall of broken skylights and glass roofs would be quite harmless to those who chanced to be beneath, if they were made of *verre trompe*. But such an accident would then be almost impossible.

M. De la Bastie is building a great manufactory, and establishing agencies for the working of his invention, and there is no doubt that it has a great future before it. The glass roofs of railway stations and work-shops, huge buildings of glass like the Crystal Palace, conservatories, the beautiful windows of Gothic churches, are all at present liable to damage from storms of hail and wind. Once the *verre trompe* comes into use, all these great surfaces of glass will be as durable as walls and roofs of steel, and the saving of repairs and the sense of security thus obtained will more than compensate for the slight additional cost. We have already referred to its use in the laboratory and the kitchen, but it would take a volume to reckon up all the purposes for which it can be employed.

A revolution in glass-making has begun in M. De la Bastie's quiet laboratory at La Besse. He has achieved what seemed impossible and changed the meanings of words. Who will talk now of things being "as brittle as glass?" And as for the venerable proverb that "those who live in glass houses shouldn't throw stones," the owner of a well-made glass house might now laugh at all the stone-throwers in Christendom, as he heard their harmless missiles rattling on his transparent walls of *verre trompe*.—*Chambers' Journal*.

Hints to Watchmakers and Jewelers.

GILLING ON STEEL.

Dissolve pure gold in aqua regia as usual; evaporate to dryness; mix with strong sulphuric acid, which will dissolve the gold and take its color; put the mixture in a funnel, the ether will swim on the top of the acid, which should be let run through the funnel, the ether only being used. The steel piece should be highly polished—very well cleaned—then heated and the solution applied with a pencil; ether will evaporate, leaving the gold adhering to the steel; the solution may be applied several times.

TO ENGRAVE ON STEEL.

Heat slightly the piece to be engraved; rub with beeswax so as to obtain a thin covering when cold; engrave on the wax so as to reach the metal; soak in strong vinegar, then sprinkle over the engraving corrosive carbonate—wet with vinegar—in five minutes wash and melt off the wax.

GOLD SOLDIER.

Proportion for 100 parts:

Silver,	54.74
Gold,	11.94
Copper,	28.17
Zinc,	5.81

99.96

Melt the three first metals together in a covered crucible; when the cover is slightly cooled add the zinc a little in excess to the proportion given, and stir up continually the alloy; this solder runs very easy and is much esteemed by manufacturers.

TO TAKE SPOTS OFF GILDING.

Boil coarse alum in soft pure water and immerse the article in the solution, or rub the spot with it and dry with sawdust.

TO RECOVER THE GOLD LOST IN COLORING. Dissolve a handful of sulphate of iron in boiling water, then add this to your "color" water; it precipitates the small particles of gold. Now draw off the water, being very careful not to disturb the auriferous sediment at the bottom. You will now proceed to wash the sediment from all trace of acid with plenty of boiling water; it will require 3 or 4 separate washings, with sufficient time between each, to allow the water to cool and the sediment to settle, before pouring the water off. Then dry in an iron vessel by the fire and finally fuse in a covered skittle pot with a flux as before directed.

ARTIFICIAL GOLD.

This is a new metallic alloy which is now very extensively used in France as a substitute for gold. Pure copper, 100 parts; zinc, or, preferably, tin, 17 parts; magnesia, 4 parts; sulphuric acid, 3.6 parts; quick-lime, 1 part; tartar of commerce, 9 parts; are mixed as follows: The copper is first melted, and the magnesia, ammonium chloride and tartar are added separately, and by degrees, in the form of powder; the whole is now briskly stirred for about 1/4 hour so as to mix thoroughly; and when the zinc is added in small grains by throwing it on the surface, and stirring until it is entirely fused; the crucible is then covered, and the fusion maintained for about 35 minutes. The surface is then skimmed, and the alloy is ready for casting. It has a fine grain, is malleable, and takes a splendid polish. It does not corrode readily, and for many purposes, is an excellent substitute for gold. When tarnished, its brilliancy can be restored by a little acidulated water. If tin be employed instead of zinc, the alloy will be more brilliant. It is very much used in France, and must ultimately attain equal popularity here.

NEW FRENCH PATENT ALLOY FOR SILVER.

Messrs. De Ronze & Fontenay have invented the following alloy, which may be used for almost all purposes in which silver is usually applied. Silver, 20 parts; purified nickel, 28 parts; copper, 52 parts. Melt the copper and nickel in the granular state, then introduce the silver. The flux to be employed is charcoal and borax, both in the state of powder; and the ingots obtained are to be rendered malleable by annealing for a considerable time in powdered charcoal.

GOLD.

To find the number of karats of gold in an object, first weigh the gold and mix with seven times its weight in silver. This alloy is beaten into thin leaves, and nitric acid is added; this dissolves the silver and copper. The remainder (gold) is then fused and weighed; by comparing the first and last weights the number of karats of pure gold is found. This operation is always repeated several times, and the difference occurs in the result all is done over again.

READ WHITE ON SILVER ARTICLES.

Heat the article to a cherry red, or a dull red heat and allow it to cool, then place it in a pickle of 5 parts sulphuric acid to 100 parts of water, and allow it to remain for an hour or two. If the surface is not right, rinse in cold water, and repeat the heating and pickling operation as before. This removes the copper from the surface of the article, leaving pure silver on the surface. When sufficiently whitened, remove from the pickle, well rinse in pure hot water and place in warm hot sawdust.

PICKLE, FOR FROSTING AND WHITENING SILVER GOODS.

Sulphuric acid, 1 dr.; water, 4 oz.; heat the pickle, and immerse the silver in it until frosted as desired; then wash off clean, and dry with a soft linen cloth, or in fine clean sawdust. For whitening only, a smaller proportion of acid may be used.

TO FROST POLISHED SILVER.

Cyanide of potassium, 1 oz.; dissolved in 1/4 pt. of water. Do not hold the silver in your hands, but use pliers made of lance

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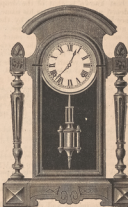
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The small iron articles are suspended in dilute sulphuric acid until the iron shows a bright clean surface. After rinsing in pure water they are placed in a bath of a mixture solution of stannous iron, sulphate of copper and cyanide of potassium, and there remain until they receive a bright coating of brass. Lastly, they are transferred to a bath of nitrate of silver, cyanide of potassium and sulphate of soda, in which they quickly received a coating of silver.

ORNAMENTAL DESIGNS ON SILVER.

Select a smooth part of the silver, and sketch on it a monogram or any other design you choose, with a sharp lead pencil, then place the article in a gold solution with the battery in good working order, and in a short time all the parts not sketched with the lead pencil will be covered with a coat of gold. After cleansing the article, the blacklead is easily removed by the fingers, and the silver ornament disclosed. A gold ornament may be produced by reversing the process.

TO EXTRACT SILVER FROM WASTE PRODUCTS.
Mix your refuse with an equal quantity of wood charcoal, place in a crucible and submit to a bright red heat, and in a short time a silver button will be found at the bottom. Carbonate of soda is another good flux.

TO SOLDER TORTOISE SHELL.

Bring the edges of the pieces of shell to fit, each other, observing to give the same inclination of grain to each, then secure them in a piece of paper, and place them between hot irons or pincers; apply pressure, and let them cool. The heat must not be so great, as to burn the shell, therefore try it first on a white piece of paper.

Viennese Jewels.

In colored gold only two qualities are, as a rule, used in Austrian gold jewelry; these are either assayed or guaranteed to be 14 or 18-karat quality. This rule is of rather recent introduction, and is well observed, especially among the leading jewelers of Vienna, who find it to their mutual advantage to have the gold of reliable quality in their work, so that, in competition, they are on an equal terms. So much is this observed that every part of an article guaranteed must be of the guaranteed quality. As an example, the following instance may be stated: Some of the best pins of 18-karat quality were sent from England with stems made of bright or 9-karat gold—a custom that is universal now in England—adapted on account of the harder nature of the alloy being better adapted for the pin. They were refused until the proper alteration was made. In the boxes at the backs of brooches and pendants the same strictness is observed, and a great many of them are jointed or made so as to open, that the jewel may be proved to be of the genuine metal.

An advantage in the large use of 18-karat gold is the better color obtained on the work. The best Viennese jewelry in this respect is very superior, having a soft, smooth, dead surface, with what we term "a satin bloom;" not a specked granular ground like that some "colorers" produce accidentally in trying to obtain a dead frosted appearance, nor the light bright polish common to the cheap English jewelry. The excellence of color is to a large extent entirely due to the better quality of gold; the action of the acids and salts used in the coloring not affecting the surface of the better quality gold to the same extent as the inferior. Of course, as is well known, the process of coloring gold is to decompose the gold and its alloys; this process is only continued long enough to dissolve the alloys (silver and copper), thus leaving a film of pure gold on the surface of the article. The better the quality of gold the less the surface is destroyed; 18-karat gold is about the lowest quality of alloyed gold upon which a good color is obtainable, but in England a large quantity of jewelry is colored of a much lower quality.

Assaying Gold and Silver.

Iron, tungsten, &c., are usually reduced with the tin, and sometimes it is advisable to ascertain the proportion of these metals. If the tungst is insoluble, it is reduced to thin leaves, or if it is brittle it is pounded up as fine as possible in an iron mortar. It is afterwards boiled with pure concentrated muriatic acid until the residue ceases to be attacked. The solution contains tin and iron. The tin is then precipitated by sulphuretted hydrogen gas. The residue is collected and treated with nitric acid; it is then evaporated to dryness, and the residue calcined into deutoxyde of tin. The solution or filtrate containing the iron is then boiled with nitric acid, in order to peroxidize the iron, and the peroxide is precipitated by carbonate of ammonia. The residue of the alloy which has not been dissolved in muriatic acid is tungsten, with only a trace of iron.

When the exact amount of iron, however, is required, the tungsten can be heated with twice its weight of sulphur in a silver crucible, and afterwards washed with water; the tungsten dissolves, and only pure oxide of iron is left.

When there is much iron in an alloy, it is less attackable by muriatic acid than when there is a large excess of tin. In this case it is better to fuse the alloy with a known quantity of pure tin, and commence as before. If not, the alloy must be boiled for some hours, during which some tungsten is oxidized, which will give a dark blue color to the solution. If no suspect zinc is alloyed with the tin, it is easy to determine the quantity by dissolving the alloy in pure nitric acid, in which only the zinc is dissolved while the tin remains in the residue in the state of oxide. The solution is evaporated to dryness, and the residue calcined at a red heat, to transform the nitrate of zinc into oxide. When we have an alloy of copper and tin, it must be dissolved in aqua regia, adding water and an excess of ammonia. The precipitate is filtered, and washed with ammonia diluted largely until the filtered water ceases to assume a blue tinge. The solution is boiled to expel the ammonia, and the liquor is treated with nitric or sulphuric acid, and the copper precipitated by iron in the usual way. The only difficulty which occurs in this case is that in the filtration of the ammoniacal liquor, small white particles of oxide of tin pass through the filter. But this may be avoided by adding two or three grains of lead to the solution before the addition of the ammonia.

Tin may contain copper, lead, iron, and arsenic. To determine the lead and copper, the pieces of tin must be flattened out, and treated with nitric acid at boiling point, until it is completely oxidized. The liquor is evaporated to dryness, filtered, and the residue calcined. If this residue is white, it consists of pure tin; but if iron is present, the residue is tinged more or less yellow. The nitric solution are evaporated to dryness in rotation, and the residue calcined in a platinum crucible; this residue is again dissolved in pure nitric acid. The lead is precipitated from the solution by sulphuric acid, and afterwards the copper by a plate of iron. To determine the quantity of iron and arsenic, another portion of tin is dissolved in muriatic acid, and the operation proceeded with as before.

When the tin does not contain lead, we can attack it by concentrated muriatic acid, to dissolve the tin and iron; but it is necessary to stop the action of the acid before all the assay piece is dissolved, or otherwise the copper would be dissolved at the same time. The residue is well washed, and treated with nitric acid, &c. The copper and the iron can thus be determined at one and the same time.

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On the Recovery of Silver From Cast Iron Crucibles.

In a recent number of *Diogenes's Journal*, two Vienna chemists named *Tschorik* and *Prizwinski*, describe the new methods for obtaining the silver absorbed by cast iron crucibles used in some mines and other establishments for fusing silver and its alloys. A cast iron crucible can be used ten to fifteen times for fusing silver, then the cracks are so considerable that it must be thrown aside. These crucibles were formerly broken up, and the bottoms and other portions which contain much silver, thrown into the very impure mother liquor from the crystallization of silver of copper. This liquor is not easily utilized in any other manner; but on putting in the iron, the copper is precipitated, while the iron goes into solution. The cement copper thus prepared, and containing all the silver, along with the graphite, silica, and other insoluble constituents of the cast iron, is treated in the usual manner for the separation of the silver. This process, however, is tedious, and the amount of material to be worked is increased instead of being diminished, for 100 lbs. of cast iron yields about 115 lbs. of cement copper.

The late director of the mint at Vienna, Von Schrutner, proposed a method for overcoming this difficulty. The crucibles are first broken up and then dissolved in dilute sulphuric acid without heat. To avoid the trouble of evaporating a large quantity of water in order to crystallize the green vitriol, in the first experiment the sulphuric acid was only moderately diluted, and consequently large quantities of anhydrous protosulphate of iron separated, and enveloped the undissolved pieces of iron, preventing them from the action of the acid. As soon, however, as the acid was diluted to 20° B., the iron dissolved rapidly. Where chamber acid can be easily obtained, it would doubtless be the cheapest. Even with acid of 60° B., it is not expensive, and the latter offers the advantage that the heat generated in diluting it helps to react and hastens the solution. The iron is dissolved in wooden vessels lined with lead, 12 to 15 feet long, 6 feet wide, and 20 inches deep, with a grating made of laths, about 8 inches from the bottom, on which the pieces of crucible are placed. As the solution becomes more concentrated it sinks to the bottom, and the iron is continually brought in contact with fresh acid. If the precaution be taken to cover the vessel tightly, the extremely disagreeable smelling gases evolved will not prove a serious disturbance.

In from ten to fourteen days, the acid becomes saturated, and the solution settles and has a concentration of 20° B. By evaporation to 60° B., the green vitriol crystallizes out. The insoluble residue amounts to about 20 per cent. It contains all the silver, silica, graphite, sesquioxide of iron, copper, and small quantities of sulphur and phosphorus. The larger pieces of silver are packed out, and the smaller are obtained by sifting and amalgamating the residue. Only the old silver and the amalgamation residue, which still contains 1.4 per cent. silver, are worked over in the silver works.

This process of recovering silver is much more rapid than the method previously in use. It has the advantage that 80 per cent. of iron is removed before proceeding to the recovery of the silver, so that the argentiferous material is reduced to one-fifth its original weight. The experience of those who employed it in Vienna show that it is thoroughly practicable, and that the green vitriol produced pays for the labor.

In the Royal-Imperial mint at Vienna, 315 old cast iron crucibles, weighing 115,192 lbs., have been treated in this way, producing 405,574 lbs. commercial sulphate of iron. The weight of the residue was 25,038 lbs. The poorer portion, and the residue from amalgamation, weighing 13,429 lbs., was smelted. Nearly 737

lbs. of silver was obtained, worth 30,143 guilders (about \$15,000), from which the percentage of silver in the cast iron is calculated at 64 per cent. The amount of silver in a cast iron crucible depends on the richness of the alloy melted in it; those used for rich alloys of course contain more silver than those in which poor ones are melted. Most of the crucibles worked up so far had been used for silver from which the Austrian small change is made, and which contains only 45 to 50 per cent. silver. The results obtained with those in which alloys containing 82.5 per cent. are fused, will, no doubt, be more favorable.

Electro-plating Solution.

The art of electro-plating is as yet in its infancy, and there is much to be learned in the practice of it as applied to the fine arts. The first practical method of depositing the noble metals favorably, was patented by the Messrs. Elkington, Birmingham, England, and the solutions employed by them, found by their experiments to be the best, were the argento-cyanide and auro-cyanide of potassium.

There are many ways of preparing solutions for electro-plating, some operators recommending the use of ferro-cyanide of potassium as solvent in place of the cyanide, but it is poor economy, as the silver is liable to strip from the articles plated in it.

Hypophosphite of silver in hydrosulphite of soda spoils by the action of light. Chloride of silver in chloride of sodium deposits a chalk like coating useful for some purposes. It answers for clock dials, etc., and is applied by simply rubbing on and then washing, as well as by the use of the battery. This solution is not practicable for the battery process. Every process requiring the dissolving of oxide, carbonate or chloride of silver is slow, wasting materials and loading the solution with salts of potash much better absent. The only solution to be relied upon is that made by the use of the double cyanide of copper and potassium and silver. There are two ways of preparing this solution, and we will give a description of each.

The first is the chemical preparation, and is considered superior to all others in every respect. The silver to be used in preparing these solutions should be pure.

First determine the size of solution you wish to make, then take the silver required to produce a solution in the proportion of 1 oz. of silver to the gallon. Dissolve the silver in nitric acid diluted with an equal bulk of water, the whole heated to about 110° Fahr. This may be done by holding the earthen dish holding the acid in a larger dish of water kept at boiling heat by the introduction of steam or any other means at command, and adding the silver in small pieces till all dissolved. This forms a solution of nitrate of silver. The solution, when ready, should now be diluted with water, say ten parts or more. Next dissolve cyanide of potassium (in the proportion of 1 lb. of cyanide to 1 oz. of silver used) in hot water, and after allowing it to settle, pour off the clear liquor from any iron sediment there may be, and filter through flannel. This clear solution of cyanide is now used to precipitate the silver from the nitrate of silver solution and give it to us as the cyanide of silver, and care must be taken not to add too much as it will redissolve the precipitated cyanide of silver. After each addition of cyanide of potassium, the white curdy precipitate of cyanide of silver should be allowed to settle till the top liquor is clear. When it is thought all the silver has been thrown down, take a little of the top liquor in a small glass and add to it a few drops of the cyanide and potassium solution, and if after standing for some time, no turbidity or milky appearance takes place, it may be considered that all the silver has been precipitated. Common salt is by some considered a surer test for silver remaining in the nitrate solution, than cyanide. The precipitated cyanide of silver is now to be thoroughly washed with hot water, water to free it from any soluble salts that may

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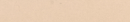
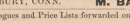
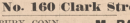
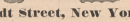
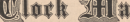
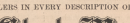
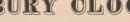
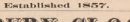
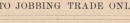
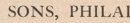
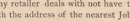
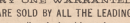
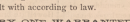
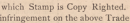
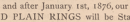
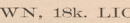
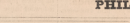
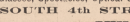
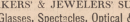
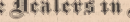
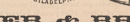
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be present, by filling the dish with water, allowing the silver to settle, leaving the top liquor entirely clear, after which, draw off the water by a syphon as closely as possible to the silver. This may be done till the acid is entirely washed out. After the silver is washed it is then ready to be redissolved in the remaining portion of cyanide of potassium, and by then diluting the solution with water to the extent first determined upon, you will have a solution for striking or coating iron, steel, or britannia metal.

It will be found expedient to add enough cyanide of potassium to make up for the loss of that consumed in precipitating the silver from the nitric acid, which is easily determined by measuring the solution used to precipitate with, and taking its proportion to the amount of cyanide solution we had after dissolving the total cyanide required in the beginning.

Should we fail to obtain an adherent coat of silver from this solution, we infer that it is too weak in cyanide, and consequently add more cautiously till a satisfactory result is reached. The cyanide is best added by first crushing it to a fine powder in a mortar. We should also add silver in proportion to the cyanide, of 1 as to the 1 lb. cyanide. This solution, if carefully prepared, will always do its work well if properly connected with a battery or electro-magnetic machine.

The solution for coating German silver, brass, &c., is made in the same manner as the first, only using twice the amount of silver (i. e. 2 oz. to the gallon of solution required), and in redissolving the cyanide of silver after it is washed, we wish to use only the amount of cyanide required to dissolve the silver, being very careful not to add the cyanide to excess, as it would injure the working qualities of the coating solution on copper and its alloys.

In the operations of dissolving the silver in nitric acid and precipitating from the acid by cyanide, both should be performed either in the open air or under a fume drawn to carry off the fumes, as these fumes, in both cases, are very injurious to the health, if inhaled by the operator. Solutions, in which articles are hung to receive the final coating of silver, after being coated in either of the above, are composed in the proportion of 1 oz. silver, 4 lb. cyanide to the gallon of solution.

Each of these solutions, to be in working order, should be kept as nearly as possible in proper proportion; but as strict accuracy cannot always be obtained, fortunately for us there are limits within which it is safe for us to vary.

The Treasures of Colocoda.

The great temple jewels and treasures of Srirangam chiefly consist of ornaments for the adornment of the god, the Krishna Avatar of Vishnu, on special occasions. There are armlets and necklaces, and breastplates and crowns, all set with gems—diamond, and ruby, and emerald, and topaz, and opal, and sapphire, and pearl. One necklace of emeralds, rubies, and diamonds, with pearl pendants, is computed to be worth six lakhs of rupees (\$300,000). The god has several umbrellas, with covers of pearl net work, and one of these bears, according to estimation, 125,000 small but extremely clear colored pearls. Amongst the treasures are huge vessels of purest gold, under the weight of which the attendants who show them to the few that are allowed to inspect the temple treasures, stagger as they bring them into the show chamber. The mass of the gold is a mass of gold sheathed for the greater part by large flat diamonds.

It is impossible to estimate the intrinsic value of the Srirangam gems. They are badly cut, and some of the largest emeralds, rubies and diamonds are scarcely cut at all. Yet some, wretchedly cut as they are, emit a surprising lustre. There are several hundreds of huge pear-shaped pearls, but these again are bored through the center, and this, although it may enhance the value of the gems in the Hindoo's eye, naturally lessens their value in the estimation of any European jeweler.

This Srirangam pagoda received a valuable gift of a portion of these jewels, a few years ago, from a peculiarly holy ascetic. This man, a Brahmin, vowed that for ten years he would not eat a morsel of food or drink a drop of water on any day that he did not receive for the god a donation of 100 rupees (\$20). He was, at first, frequently nearly starved to death, but such a devotee was not to be lost to the faith. The priests rallied around him, and, at the end of the stipulated term, he presented the temple with a magnificent necklace of emeralds, and rubies, and other ornaments, worth respectively of \$125,000. This story may be taken *com grano salis*, but, in the main, it is believed to be true.

Misused Words.

JEWELRY.—Many women, and some men, who should know better, are in the habit of speaking of their jewelry when they mean their jewels. The words thus used is of very low caste. Think of Cornelia pointing to the Gracchi and saying, "These are my jewelry," or read thus a grand passage in the last of the Hebrew prophets: "And they shall be mine, saith the Lord of Hosts, in that day when I make up my jewelry!" As applied to trinkets and precious stones, the word means, at best, jewels in general, not any particular jewels. It is of very late introduction in any sense; not being in Shakespeare, or the Bible, or Milton, or Johnson's Dictionary. The earliest authority quoted for it by Richardson is Barke, who speaks of "the jewelry and goods" of India. But, properly, jewels are no more jewelry than shrubs are shrubbery, slaves slavery, or beggars beggary.

Jewelry is properly the name of the place where jewels are kept, as slavery is the name of the condition in which slaves are kept, as beggary is that of the condition in which beggars are, and as shrubbery is that of ground filled with shrubs. These words belong to a numerous class ending in *ry*, which express place, or condition, which is a moral place. Such are bellfry, library, laundry, bakery, buttery, aviary, grocery, pottery, armory, infirmary, bindery, confectionery. From grog we have rightly formed groggery; and our transmitters of the Bible called Judah, the place of the Jews, Jewry. Now, we might as well call a knot of Jews Jewry, or whisky toddy and rum punch groggery, as a set of jewels Jewery. But Jewery is one of a few of these words which have been perverted by careless speakers. Such are confectionary, pastry, and crockery. Confections are made by a confectioner, and kept in a confectionary; paste is kept in a pastry; and crocks, made by a crocker, are kept in a crockery. All these words have been thus correctly used. We have the proper name Crocker, derived from the occupation, like Baker or Baxter, Webster, Webber or Webb, and Fuller; and Howell (to be sure) has even one of his letters, that Felton, the murderer of the Duke of Buckingham, in his attempt to escape, "was so much terrified, he held his way, and so struck into the pastry, where"—he was arrested. The perversion of jewelry, confectionary, pastry, pottery, and crockery is probably due to the substitution of signs inscribed with those first used, which were merely decorated with some device or sign—whence the name. The jeweler put up "jewelry" over his shop door, and the crocker "crockery," and so forth; and these names of places were at last misapprehended as names of articles for sale in those places. As crock passed out of use as a general name, (although no one nowadays has any difficulty in understanding the title of the story of the "Crock of Gold,") crockery was the first, and is the best established of these perverted words. Next comes confectionary, although confections is not quite out of use, and might be easily replaced by confection; and the last, pottery and jewel leaves no excuse (except conformity to a bad custom which perverts meaning, cramps language, and violates

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analogy) displacing them in favor of pottery, jewelry.

KINSMAN.

For this hearty English word, full of manhood and warm blood, elegant people have forced upon so many a vague, misty and subtle—relation and connection. By the use of the latter words in the place of the former, nothing is gained and much is lost. Both of them are very general terms. Men have relations of various kinds, and connections are of still wider distinction. Even in regard to family and friends, it is impossible to give these words exactness of meaning: whereas, a man's kin, his kinsmen, are only those of his own blood, while his brother-in-law, while his brother-in-law, is not. Yet relation is made to express both connections, one of blood and the other of law. In losing kinsman we lose also his frank, sweet-tongued sister, kinswoman, and are obliged to give her place to that poor, mealy-mouthed, ill-mannered Latin interloper, female relation.—*Words and Their Uses*, by Richard Grant White.

Shell Cameos.

Shell is the protective covering of nucleus of animals widely distributed throughout the earth, the fresh waters and the ocean. This covering is in most cases exterior and large enough to enclose the whole body; but in some cases it is interior, and only of sufficient size to protect the heart and lungs. Shell is a secretion from the skin which covers the back of the animal, which is of a peculiar thickness and fleshy consistence, and is called the mantle. Shells are called univalve or bivalve, according as they consist of one part, or of two parts joined together by a hinge. Bivalves are inferior in the scale of existence to univalves, both as to power of motion and organs of sense.

Most of the univalve shells are of the character called porcelaneous, from their brittleness, translucence and the resemblance of their fracture to that of porcelain. But this fracture when examined by a microscope reveals a structure of thick parallel layers, usually of a fine fibrous nature, at right angles to the external surface. The soluble part of these shells is carbonate of lime, the particles of which are cemented together with a very minute proportion of animal mucus. The hard and compact nature of such shells, and their generally smooth surface prevent their being cut by the ordinary tools, which are available for the less hard and fragile nacreous shells; it is therefore necessary to treat them with emery, rottenstone and other substances harder than themselves.

Such shells generally require rather to be polished than cut, but where it is necessary to divide them in order to exhibit their sections, they are operated upon by means of the slicer with diamond powder. Certain descriptions of these shells are well adapted for cameo cutting, on account of their substance being made up of differently colored layers, and also on account of a difference of hardness and texture in the various layers, some approaching more nearly to the nature of nacreous than of porcelaneous material.

Several varieties of the genus Strombus, or conch, supply suitable shells for cameo cutting. The outer layer is nearly colorless, can be operated upon with steel tools, and may be carved into smooth and finished forms. Extensive work is taught the cameo-cutter to choose the kinds known as the Bull's Mouth, the Black Helmet, the Hornet Helmet, and the Queen Couch, of which the first two are the best. The art of cameo-cutting was confined to Rome for upwards of forty years, and to Italy until the last twenty-six years, at which time an Italian, named Giovanni, came to Paris, and now over 500 persons are employed in the trade in that city.

About thirty years ago, the total annual number of shells used in the trade was about four hundred; the whole of these were sent from England, and they were worth thirty shillings each in Rome. But so rapid was the progress of the manu-

ture when it became more widely diffused, that the following estimate was made a few years ago as to the consumption of shells in France alone for that purpose, viz., 100,500 shells, worth \$2,950.

The average value of the large cameos made in Paris, as stated by the authority of Gray, is six francs each, and the total value of 232,000 and the value of the small cameos is about 28,000, while at the same time in England, not more than a dozen was employed for the same purpose. The Black Helmet, on account of the advantageous contrast of color in the layers, produces very effective cameos, the carved figure of the white upper layer being strongly relieved by the dark, almost black ground supplied by the second layer. The shell is first cut into pieces the size of the required cameos, by means of diamond dust and the slitting mill, or by a blade of steel fed with emery and water.

It is then carefully shaped into a square, oval or other shape on the griststone, and the edges finished with oil stone. It is then cemented to a block of wood, which serves as a handle to be grasped by the artist while tracing out with a pencil the figure to be cut on the shell.

The pencil mark is followed by a sharp point, which scratches the desired outline, and this again by delicate tools of steel wire flattened at the end and hardened, and by files and gravers, for the removal of the superfluous portions of the white enamel. A common drawing needle fixed in a wooden handle, and a saw set in this very minute and delicate species of carving. The careful manipulation necessary in this work can only be acquired by experience; the general shape must first be wrought, care being taken to leave every projection rather in excess to be gradually reduced as the details and finished of the work are approached. To render the high parts more distinct during the process of carving they are slightly marked in black.

Throughout the cutting great caution must be observed, that in removing the white thickness the dark ground is not damaged, as the natural surface of the dark layer is far superior to any that can be given artificially; indeed, should the dark be broken up at one part, it would be requisite to remove the entire scale or lamina from the whole surface, a process that will be found very tedious, and much more difficult than separating the white from the black. In order that the finished cameo may possess a distinct outline at all points of view, it is desirable to adopt the system followed in antique cameos; namely, to leave all the edges of the figure quite square from the ground, and not gradually rounded down to the dark surface; should this latter method be followed, it will be found that the outline is in many places undefined, owing to the color of the white raised figure of the cameo gradually emerging into that of the dark ground; this evil is entirely avoided by leaving the edge of the figure quite square, the thickness of one fifth of an inch.

The surface of the cameo should be finished as nearly as possible with the cutting tools, as all polishing with abrasive powders is liable to remove the sharp edges of the figures, and deteriorate the cameo by leaving the form undefined. When, however, the work has been finished as smooth as possible by the use of fine tools, the final polish may be given by a little putty-powder used dry, upon a moderately stiff brush, applied with care, and rather to the dark ground than to the carved surface; this is the concluding process, after which the cameo is ready for removing from the block prior to mounting.

The various styles in which they are mounted depend upon a great deal upon the country where they are to be worn. Here the public taste seems to select either pearls or antique gold settings, while now and then we meet some exotic classical design surrounded by precious stones.

Mr. Smith, of the firm of Smith & Hedges, the well-known diamond importers, arrived from London, on the 20th ult. Mr. Smith has been absent several months visiting the principal diamond markets of Europe in search of goods suitable for this market. Mr. Smith brings with him a special invoice of extremely fine goods, such as are seldom seen here.

CHATELLIER & SPENCE, Manufacturing Jewelers,

No. 652 BROADWAY, NEW YORK.

1129 Chestnut St., PHILADELPHIA, PA.

12 West Street, BOSTON, MASS.

120 Sutter Street, SAN FRANCISCO, CAL.

SMILLIE, DORRANCE & EDGE, Manufacturing Jewelers,

No. 5 Maiden Lane, New York,

Manufacturers of Chain Bracelets,

Necklaces, Opera Chains, etc., from their New Woven

Fabric Chain, 14 and 18 kt. only.

POST, BEACH & DECKER,

No. 192 BROADWAY,

Manufacturers of Fine Jewelry,

BAND BRACELETS A SPECIALTY.

JOHN A. RILEY & CO.

Manufacturing Jewelers,

Nos. 7 & 9 Bond Street,

NEW YORK.

Etruscan Gold and Coral Sets—Roman Bracelets, Necklaces, &c.

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R. STRICKLAND & CO.

MANUFACTURERS OF

Fine Silver Plated Goods

Salesroom, 516 & 518 BROADWAY,

ALBANY, N. Y.

Catalogues and Price Lists furnished on application by mail.

My Watch.

BY MARK TWAIN.

My beautiful new watch had run eighteen months without losing or gaining, and without breaking any part of its machinery or stopping. I had come to believe it infallible in its judgments about the time of day, and to consider its constitution and anatomy imperishable. But at last, one night, I let it run down. I grieved about it as if it were a recognized messenger and forerunner of calamity. But by-and-by I cheered up, set the watch by guess, and commanded my boding and superstitions to depart. Next day I stepped into the chief jeweler's to set it by the exact time, and the head of the establishment took it out of my hand and proceeded to set it for me. Then he said, "she is four minutes slow—regulator wants pushing up."

I tried to stop him—tried to make him understand that the watch kept perfect time. But no; all this human cabbage could see was that the watch was four minutes slow, and the regulator must be pushed up a little—and so while I danced around him in anguish, and beseeched him to let the watch alone, he calmly and cruelly did the shameful deed. My watch began to gain. I gained faster and faster day by day. Within the week it sickened to a raging fever, and its pulse went up to a hundred and fifty in the shade.

At the end of two months it had left all the timepieces of the town far in the rear, and was a fraction over thirteen days ahead of the almanac. It was away into November enjoying the snow, while the October leaves were still turning. It hurried up house-rent, bills payable, and such things, in such a ruinous way that I could not abide it. I took it to the watchmaker to be regulated. He asked me if I had ever had it repaired. I said no—it never needed any repairing. He looked a look of vicious happiness and eagerly pinned the watch open, then put a small dice box into its eye and peered into its machinery. He said it wanted cleaning and oiling, besides regulating—come in a week. After being cleaned and oiled and regulated, my watch slowed down to that degree that it ticked like a tolling bell. I began to be left by trains, I failed all appointments, I got to missing my dinner; my watch strung out three day's grace to four, and let me go to protest; I gradually drifted back into yesterday, then day before, then into last week, and by-and-by the comprehension came upon me that, all solitary and alone, I was lingering along in week before last, and the world was out of my sight. I seemed to detect in myself a sort of sneaking fellowship for the mummy in the museum, and a desire to swap news with him. I went to a watchmaker again. He took the watch all to pieces while I waited, and then said the barrel was "swelled." He said he could reduce it in three days.

After this the watch *acquired* well; but nothing more. For half a day it would go like the very mischief, and keep up such barking and whining and wheezing and sneezing and snorting, that I could not bear myself think for the disturbance; and as long as it held out, there was not a breath in the land that stood any chance against it. But the rest of the day it would keep on slowing down and fooling along until all the clocks it had left behind had caught up again. So at last, at the end of twenty-four hours it would trot up to the judge's stand all right and just on time. It would show a fair and square average, and no man could say that it had done more or less than its duty. But a correct average is only a mild virtue in a watch, and I took this instrument to another watchmaker. He said the kingbolt was broken. I said I was glad it was nothing more serious. To tell the plain truth, I had no idea what the kingbolt was, but I did not choose to appear ignorant to a stranger.

He repaired the kingbolt, but what the watch gained in one way it lost in another. It would run awhile and then stop awhile, and then run awhile again, and so on, using its own discretion about the intervals. And every time it went off it kicked back like a mule. I padded my breast for a few days, but finally took the watch to another watchmaker. He picked it all to pieces, and turned the ruin all over and under his glass; he then said there appeared to be something the matter with the hair trigger. He fixed it and gave it a fresh start. It did well now, except that always at ten minutes to ten the hands would shut together like a pair of scissors, and from that time forth they would travel together. The oldest man in the world could not make head nor tail of the time of the day by such a watch, so I went again to have the thing repaired. This person said that the crystal had got bent, and that the mainspring was not straight. He also remarked that part of the works needed half-soling. He made those things all right, and then my time-piece performed unexpectably, save now and then, after working along quietly for nearly eight hours, everything inside would let go all of a sudden and begin to buzz like a bee, and the hands would straightaway begin to spin round and round so fast that their individuality was lost completely, and they simply seemed a delicate spider's web over the face of the watch. She would reel off the next twenty-four hours in six or seven minutes, and then stop with a bang.

I went with a heavy heart to one more watchmaker, and looked on while he took her to pieces. Then I prepared to cross-question him rigidly, for this thing was getting serious. The watch had cost two hundred dollars originally, and I seemed to have paid out two or three thousand for repairs. While I waited and looked on, I presently recognized in this watchmaker an old acquaintance—a steamboat engineer of other days, and not a good engineer either. He examined all the parts carefully just as all the other watchmakers had done, and then delivered his verdict with the same confidence of manner.

He said:
"She makes too much steam—you want to hang the money wrench on the safety-valve."

I brained him on the spot, and had him hurried at my own expense.

My uncle William (now deceased, alas!) used to say that a good horse was a good horse until it had a good way once, and that a good watch was a good watch until the regulators got a chance at it. And he used to wonder what became of all the unsuccessful tinkers, and gunsmiths, and blacksmiths; and no body could ever tell him.

[The above appeared originally in one of the early volumes of this journal, and at the request of several readers we here present it a second time.—Ed.]

Mr. A. H. Briggs of the firm of Frasse & Co., was married on the 24th ult., to Miss Abbie L. Miller, of Jersey City. Our friend has scattered his handiworkings so promiscuously, not even those who knew him best had ever dreamed of such a thing as his beginning to concentrate. But in the twinkling of an eye, he disappears probably and unobserved, the convictions of his friends by an act of immolation upon the altar of Hymen. We wish the young couple a happy and prosperous voyage through life, and a fleet of little Briggs to welcome them safely into port.

In Plazmet's process a bath is used of 87 1/2 parts sulphate of nickel, 30 sulphate of ammonia, 17 citric acid, and 1,250 of water. A bath much used in France is formed of a solution of 4 parts of nitrate of nickel to 4 of solid ammoniac, and 140 water in which 20 parts of sulphate of soda have been dissolved. Using a moderate weak current the operation is at an end in a few minutes. There is no need to interrupt it by taking the objects out and brushing them. When the film of nickel is of sufficient thickness, the objects are withdrawn from the bath and dried with sawdust.

ENOS RICHARDSON & CO.

MANUFACTURERS OF

FINE GOLD JEWELRY,

Gold Chains, Lockets, Cresses and Necklaces,
COLORED AND ETRUSCAN WORK.

ALL GOODS SOLD, STRICTLY OF OUR OWN MANUFACTURE

23 Maiden Lane, New York.

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L. P. BROWN,

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W. F. MELCHER.CELLULOID NOVELTY COMPANY,
14 Maiden Lane, New York.

Manufacturers of

IMITATION

Coral Jewelry.



MEDALLION

Settis

A SPECIALTY.

Our goods are an exact imitation of the Imported Coral Goods. Ladies' Settis, Pin and Ear-rings, Shawl Pins, Cresses, Necklaces. Gent's Studs and Shave Buttons, Scarf Pin and Rings, mounted either in solid gold or plate.

LOUIS A. SCHERR,

WHOLESALE DEALER IN

Watches, Jewelry, Silver & Plated Ware,

OPERA GLASSES, SPECTACLES, FANCY GOODS,

Watch Materials, Tools, Glasses, &c.

726 CHESTNUT STREET.

Formerly 403 Chestnut Street,

PHILADELPHIA.

MORGAN & HEADLY,
Manufacturing Jewelers.

No. 613 SANSON STREET,

PHILADELPHIA.

Vest, Opera, and Guard Chains, Stone-Cameo, Coral, Amethyst and Gold Sets, Enamelled and Roman Bands, Roman Lockets, Stone Lockets, Studs and Buttons, Stone and Plain Gold Rings, Gold Spectacles, Eye-Glasses, &c.

JOHN COOK,

MANUFACTURER OF



CENTENNIAL PATTERN.

Silver Tea Sets, Pitchers,

WAITERS, CUPS,

Goblets, Spoons, Forks, Knives, &c.

No. 6 LIBERTY PLACE, near Maiden Lane, NEW YORK

SEND FOR PRICE LIST.

Climate—Its Influence on the Watch.

A few years ago I read an article in the late *Horological Journal*, written by a watchmaker, on the subject of "Pivot Rust." He seemed to be at a loss to know what was the cause of it, or, indeed, whether it really was rust. I think I have come in contact with as much of it in this section, as any other workman in the same time—seventeen years. I pronounce it rust—my reason for which I will state presently. And if those reasons be correct, the same cause does not exist in every locality, at least not to the same extent.

This red dust, or rust, is formed more frequently in the English Lever where the pivots are run in brass. And those pivots most subject to it are the long ones—the winding post, the second wheel and center wheel. But the greatest trouble with me has been the cannon pivot, which has frequently been found set fast, as though it had been brazed there. When the gun does not start it, I most generally beat the point of the cannon with the blow pipe, and cut it off with the cutting file. But this takes quick work, as the cannon should not get cold. Sometimes, however, a fine English Lever is found in this condition, which has a jewel under the cannon pivot. In that case it will not do to resort to pull or blows. My plan has been to carefully file it off and put in a new one.

Sometimes watches come in that have not been stopped running very long, and yet it takes a considerable pull to bring those wheels from their place. In a great many instances I have found after such steel was removed, that the pivot, though the hardest tempered steel, has been set round the thickness of the plate, as though it had been done with a square edged file. This, in all probability, is the reason why the foreword writer came to the conclusion that it was something other than rust, from the fact that it seems to do its work more thoroughly than if supplied with steel. What astonishes me is, that the hard steel is so worn away, whilst the face of the brass seems not to have been worn any. I should be pleased to hear the experience of some of your correspondents on this subject.

The reason why I think it rust is, when I worked in the up-hill country of Georgia and East Tennessee, twenty years ago, I never saw a watch in any such condition, unless it had actually got wet. But here in Texas the air is different. It seems to me that it is, especially at times, heavily charged with salt. Within a mile south of my shop, is ground where, at times, I have raked up handfuls of pure grained salt. I conclude that a wet wind passing over this becomes charged with it. And then there is a place called the Saline, some sixty miles southwest of this, where, in time of war, they made thousands of bushels of salt. Also, for days in succession, we have what is called "gulf winds," but whether they would carry vapor of salt three hundred miles, I am at a loss to know.

The same might be said of the gun and revolvers as the watch. In Georgia, as well as Texas, I was always fond of my gun; but he who would enjoy sporting here must pay dear for it in the way of rubbing and scrubbing his towing piece.

That Scripture "where moth and rust do corrupt, etc." was never so forcibly nor so sensibly impressed upon my mind, until since living in this State. I have had a great many fine steel tools, materials and other articles ruined before I was aware of it. Where I was raised I do not remember having ever seen anything so seriously injured by rust. But here, I could write pages on the corruptions of the corroding tooth of rust.

Henry C. Haskell, Manufacturing Jeweler, 25 Maiden Lane, makes rings a specialty. Mr. Haskell is a gentleman well and favorably known throughout the trade, and his goods may be thoroughly relied upon.

American vs. English Watches.

Sir Edmund Beckett, a scientific horologist, who is, perhaps, the highest English authority upon the subject, in his work upon "Watches, clocks and Bells," says:

"The liability of a watch, like any other piece of mechanism, to require repair is in the ratio of the number of separate parts which make up its mimicry. The English watch, with its fusee and chain, is composed of 438 more pieces than the American watch. Dispense with these 438 additional chances of breakings, and it is easy to infer the superiority of American watches, in this one respect at least. The fusee and chain are rejected in the Waltheim watches, and the direct action of the main spring adopted, because the fusee and the chain add greatly to the cost of a watch, and its tendency to injury, and are of no practical value for good time-keeping. This change is advocated upon the ground that there is greater simplicity of action, less friction in the transmission of motive power, increased facility for making a lighter and more uniform spring, and more room for play in the other parts of the movements."

In support of this view, Sir Edmund Beckett speaks very favorably of the American principle of committing the chain after allowing to what he calls the mischievous and common accidents of chain-breaking, and noting the tendency of advanced watch making to do without the fusee and chain, he says: "Accordingly, both in Switzerland and America, which are gradually stealing away our common watch trade, the fusee and the chain are almost universally omitted."

Coral Jewelry.

When people read of the coral-reefs of the South Pacific Islands, they are apt to suppose that the beautiful pink and scarlet coral of commerce is obtained from those reefs; but this is altogether a mistake. The coral of the South Sea Islands is valuable, being of a spongy texture, and without that bright color which is so attractive. The coral which is used for jewelry is found in three different parts of the Mediterranean off the coast of Spain, near the island of Sicily and off the coast of Africa. The first is heavy, and of a delicate pink; the Sicilian very thin, and of a dark red; the African of a medium thickness and containing a different degree of temperature. As the water is too cold for them to obtain the coral by diving, they use a net of peculiar construction, the bottom of which is lined with cotton. This net is wound round the coral, which is generally found on rocky projections at the bottom of the sea, and the cotton, twining itself around the coral branches, makes the net fast to them, when it is drawn up with a jerk which detaches the coral from its rocky bed. These branches are generally about three or four inches in width, seldom attaining sixteen inches; and of this only about one-third is useful for manufacturing purposes.

The vessels engaged in this pursuit are about 100 tons each, and belong to the great corporations in Naples, who hire workers and control the market. These houses supply the coral to the manufacturers, of whom there are very few, as the business, from the great value of the stock, requires an enormous capital. The pores of the coral are very close, and the material is very hard and brittle, so that it requires the most skillful manipulation on the part of the workmen. They are trained from their childhood to this trade, which is carried on entirely by hand—the knife and file being the only tools used—and which is handed down from father to son.

Prior to 1848, the dark red coral was the most fashionable; but since that time, the pink coral, which is more delicate in its tints and more difficult to match, and consequently more valuable, has become the fashion and is yearly more and more sought after. It is this difficulty of matching any one piece of coral that tends to enhance its value to such an extent. The thousand and one fantastic shapes into which nature has twisted it in its recent bed render it almost impossible to reproduce in exactness any pattern.

Messrs. Erizzo Bros. of Zolares, deal exclusively in coral goods, which they obtain direct from their manufacturing in Naples. Their productions have achieved a high reputation under Mr. Erizzo has recently returned from Naples, with a large invoice of the newest designs, suited to the requirements of the market and embracing a variety of objects, from the designs of the popular trade.

Dealers visiting the city in search of goods here offered would do well to call on Messrs. Erizzo Bros., who will be happy to show them through their stock.

MILLER BRO'S
MANUFACTURING JEWELERS,

11 MAIDEN LANE, New York.

INITIAL GOODS A SPECIALTY!

Sets, Sleeve Buttons, Studs, Collar and Chemise Buttons, Embroidered, Plain, Engraved and Human Gosh.



Mounted in Pearl, Stone Cameo, Onyx, Amethyst, Topaz, Coral, Ac. Ac.

Manufactory, 47, 49 & 51 Franklin Street,

JAMES W. MILLER, Newark, N. J. ISAAC M. MILLER.

SHAFER & DOUGLAS,

MANUFACTURERS OF

Fine Jewelry,

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Factory, No. 355 and 357 Mulberry Street, Newark, N. J.

ENGRAVED & ENEAMELED SETS, PINS, EAR-RINGS,

SLEEVE BUTTONS AND STUDS.

SEAL RINGS A SPECIALTY!

SPECIAL ATTENTION IS INVITED TO OUR

Amethyst, Topaz, Stone Cameo, Incrusted Amethyst, Incrusted Garnet and Sardonyx Rings.

International Watch Co.

OF NEW YORK.



This cut illustrates one of our NEWEST, DEAD WINDING MOVEMENTS, NAMED INTERNATIONAL CO. "D," which we have just received.

It has 5 pairs Ruby and Upper Centre Jeweled; Upper Jewels set in Gold; Ruby End Stones; Exposed Ruby Pallets; Breguet Hairspring and is Compensation Balance.

We unhesitatingly recommend this movement to our patrons, as being superior in quality and finish to any ever before offered at the price.

SCHWOB BROS. & CO.,

P. O. Box 2310.

No. 173 BROADWAY,

GENERAL AGENTS.

NEW YORK.

It will thus be seen that the reason underlying all the difficulties in the way of trade organization, to this as well as to other useful ends, is the low standard too prevalent in the trade. The only way to

get over this difficulty is for the best men to persevere, start organizations in a modest way, and thus gradually build up a higher standard to which others will more and more fit their ideas. Mr. J. F. Fisher, of America, Gas, Cyde, of New York, and other gentlemen of character have already urged the establishment of State Horological Societies, but thus far their efforts have not had the success they deserve, prompted as they were by the most disinterested motives, whose sole aim was to raise the trade standard and afford help to deserving brethren. But such organizations must come sooner or later, and with them, or before them, local horological clubs, and at last, perhaps, a National Horological Society. Our Horological Club, whose meetings are so fully reported in the CIRCULAR, is a very useful institution. We are ready to admit, but a club with members, as well as a Secretary, is a good thing, too. We hope ultimately to see many trade societies organized in actuality as well as on paper, for such organizations for the purposes of friendly consultation and informing discussion will come to mean to bring about a better time coming. It is scarcely necessary for us to promise them the best assistance of the JEWELLER, CIRCULAR and of all who are in sympathy with its aims.

"Large Sales and Small Profits."

This is a safe motto, so long as its meaning is thoroughly kept in mind, but large sales and no profits is "a horse of another color" too often mistaken for it. There is a very good story of a man who bought fish-hooks at two cents and sold them at one, and when asked how he made money out of that, he said it was because he did so large a business. There are only too many manufacturers and shopkeepers who are trying to counteract dull times by this method of the fishhook man. They are vainly trying to keep up the volume of sales of such years as 1895-7 by offering goods at prices which must sooner or later be paid into the bankruptcy.

For it is to be remembered, as we have more than ever pointed out, that profit is not the same as the margin between "first cost" and selling price. "Cost" to a retailer, for instance, is the wholesale price he paid for his goods, plus its proportion of rent, clerk hire, and all such regular or incidental expenses, and plus, properly, some compensation for his own services. If he sells goods "at cost," meaning the wholesale prices he paid, he is out the amount of all these expenses and the cost of his own living, and somebody else must pay his bills to that extent, unless he has a sufficient capital of his own to fall back upon. If he even sells for \$10 a bracelet he paid \$2.50 for, he is probably not getting back the actual cost of that piece of goods to him as it is delivered over his counter, and he is in one way or another losing away other people's money. So when a dealer begins to sell "at cost," look out for him, and if you are the jeweler across the street from his shop, stand not so far off and explain to your customers that for you one purpose to pay your bills.

An Important Decision.

A decision has just been given in the action brought by Mafford, Hale & Cottle against Pearce, Karsh & Co., for infringement of letters patent granted to the former firm for "an improvement in chains and chain-links for necklaces, etc." The decision was rendered by Judge Shipman, of the U. S. Circuit Court, and decrees an injunction restraining the defendants from further infringement, and orders a reference to take and state the case due for past infringements.

Letters patent were granted the complainants for a combination of ordinary round closed links, and links made of one or more coils of gold tubing fitted at the open ends with a slot. These latter links possess an elasticity which is not effected by annealing, and the discovery of this fact led to the invention. There are therefore two kinds of links, one round and closed, the other spiral, elastic and not closed, and these links can be finished, polished or closed separately,

and then united by slipping the closed links inside those of elastic tubing.

The patentees claim that the advantages of this combination are—1st, That as the links can be finished separately, the cost of production is greatly diminished; 2d, That owing to the elasticity of the spiral links, the chains can be easily separated by the fingers of the wearer, and, if so desired, united without injury in different designs. This adaptation of the peculiar quality of the spiral links to a useful result being original, the court supported the grant of letters patent as above stated. The defendants impugned the novelty of the invention by proving that chains of spiral or split rings were well known to the trade, but it appeared that these split rings were made differently, and did not possess the peculiar elastic qualities of the spiral rings patented by the complainants.

It was also attempted to prove that chains of spiral links made of gold tubing had been used before. But although it was proved that chains had been made of such links, yet the custom was to solder them together, and the peculiar elastic quality had never been made use of. The chains referred to could not be taken apart, but those now patented can be severed and united at will.

It was also suggested that the specification did not describe a sufficiently definite manufacture with sufficient minuteness. But as every working jeweler knows what gold tubing is, and how it is made, the court very properly held that such description of manufacture would be a waste of words.

Centralizing Business.

The importance of centralizing a large business seems to be becoming generally understood in the manufacturing jewelry trade, and is leading to the curious paradox of the manufacturing shops seeking accommodation in the very heart of the great cities, where it was supposed only more office and warehouse accommodations could be afforded. But so many large buildings formerly built by lease have been left vacant that rents are not so stiff as they were, and in this condition of things it is found that the advantage of centralizing business, and the saving in traveling and transportation expenses quite overbalance any added cost for rent.

We are glad to chronicle the removal of the Whiting Manufacturing Company's shop from Attleboro, Mass., to New York, where it will now have its entire business consolidated under one roof. This well-known house has recently leased for a term of years the spacious building, 694 and 696 Broadway, on the south-east corner of Fourth street, extending through to Lafayette Place, a location close to the new rendezvous of the wholesale jewelry trade-up-towns. They occupy the main portion of the building, and as they do not enter to, or indeed sell at retail, but devote to their trade entirely to transfer to all the former workmen and their families directly and simultaneously to New York, where they will now have everything under direct and unified control. The Company, as is well known to the trade, has done much fine work from special designs, requiring constant consultation with its artists in the factory, and therefore constant traveling to and so frequent delay. This is one of the difficulties removed by the removal, and in many other respects the Company and its customers will be greatly benefited by the change. We wish it abiding prosperity in the new quarters.

The large tower clock lately placed in the tower of the Catholic church, Cincinnati, Ohio, was made by the Seth Thomas Clock Company, Thomaston, Conn., and is a fine piece of work. The movement is one of their No. 10 series, with working train for the hours and quarter hours, and the time part all in one frame. When properly regulated this clock will run very accurately. Mr. Henry Korf, who purchased the clock, writes: "The clock is doing splendidly—not varying two seconds per week thus far."

LeBoutillier & Bride,

IMPORTERS,

10 Maiden Lane, N. Y.

NEW IMPORTATIONS OF

FRENCH CLOCKS,

BRONZES, MUSICAL BOXES,

RICH FANCY GOODS.

SPECIAL NOTICE.

We are now prepared to submit to OUT OF TOWN CUSTOMERS Photographs of our Goods, in order to give readers the advantage of seeing and ordering the latest designs. These Photographs will give the exact measurement and prices.

Applicants unknown to us will please give city references.

FORMERLY

Shepard, LeBoutillier & Co.

CRYSTAL CHANDELIERS

GILT, BRONZE & DECORATED GAS FIXTURES,

Fine Marble & Bronze CLOCKS,

Bronze Figures and Ornaments in Greatest Variety, at Low Prices, Manufactured by

Mitchell, Vance & Co.

No. 597 BROADWAY NEW YORK.

"Medal of Special Award" by American Institute, 1872,

No. 719, GAS FIXTURES.

MITCHELL, VANCE & CO., 597 Broadway, N. Y.

We find the above-mentioned Figures and Glass Chandeliers, for design, excellence of workmanship and finish in all their parts, to be the best production in the country and we may say, in our judgment, excelled by no other country in the world.

"We recommend a MEDAL OF SPECIAL AWARD for CHANDELIERS and GAS FIXTURES."

(Signed) JOHN W. CHAMBERS, Secretary.

"Medal of Special Award confirmed."

HOLIDAY GOODS!

The especial attention of the Trade is called to our large line of

Artistic Bronzes,

COMPRISING

STATUETTES IN PAIRS,
CARD RECEIPTS, VASES,
BUSTS, GROUPS, BIRDS, &c.

OF BEAUTIFUL DESIGN & FINISH.

Fully equal to the best imported article, and at LOWER PRICES.

ARCHER & PANCOAST MFG. CO

87 Greene Street,
95, 70, 72 Wooster Street, Above Broadway



AMERICAN WATCH COMPANY

OF WALTHAM.

NEW LADIES' STEM-WINDING MOVEMENTS.

Named Amerⁿ Watch Co.

RIVERSIDE!



The above Movement is made in 8 size [English], has expansion adjusted balance, hardened and tempered hairspring and exposed pallets, and after one year's trial proves itself a thoroughly good and reliable Stem-Winder and Time-Keeper.

We have constantly on hand a full assortment of Gold Cases for the above movement in 14 & 18 karat, warranted plump quality, and unsurpassed for beauty of finish and style.

Dealers should see these Gold Watches complete before ordering Gold Cases elsewhere

**The cheapest Lady's Stem Winding Movement ever offered
by any manufacturer, either Swiss or American.**

ROBBINS & APPLETON,

No. 1 Bond Street, New York.

No. 8 Summer Street, Boston.

No. 5 Tribune Building, Chicago.

Curiosities of Clocks and Watches.

By EDWARD J. WOOD.

Pierre Auguste Caron de Beaumarchais, who was born at Paris, in January, 1732, was the son of Caron, a watchmaker of that city; and was by his father brought up to the same profession, in which he acquired considerable skill, gaining a prize from the French Academy of Sciences for an improvement in watchmaking when only twenty-two years of age. This introduced him into a prominent position. Louis XV. condescended to examine a watch made by him for Madame de Pompadour, set in a ring; and that sovereign's approbation, Madame de Pompadour's acquaintance with both the Caron watches and their maker. Beaumarchais was also very fond of music, and attained great proficiency in playing on the harp and the guitar. He performed before the daughters of Louis XV., who being pleased with his musical skill admitted him to their concerts, and afterwards to their parties. He who had formerly sold the ladies of the court pretty watches became their instructor on the harp, and the conductor of their musical recreations. He consequently appeared at Versailles in rich court-dress, which cost offended a haughty nobleman, who, meeting him one day in a gallery, there, asked him to look at a valuable watch that he wore, which was out of order. Beaumarchais, observing the sarcasm implied in the request, excused himself by saying that his hand was very unsteady; but the nobleman, insisting, the other took the watch, and immediately dropped it on the floor, observing, "I told you so." Beaumarchais then quietly took the watch, and, after examining it, gave him the opportunity of becoming connected with some of the Fermiers-Generaux and great contractors, who became involved in several lawsuits, and gained considerable notoriety in the sequence of his writing and publishing the particulars and pleadings of his case, which showed great skill and power. His fame as a writer rests on his plays, and chiefly on the well-known opera, "Le Barbier de Seville," and "Le Mariage de Figaro." The character of Figaro was a happy invention, and the character of Figaro in both plays are drawn with much ingenuity. "Figaro" alone produced the author eighty thousand francs. At the commencement of the revolt of the English American provinces Beaumarchais entered into a speculation for supplying the colonies with arms and ammunition; and although he lost several vessels, the greater number arrived at America, and the speculator at first enriched himself by his adventure, but eventually became a heavy loser through the alleged bad faith of the American contractors. When the French revolution broke out, Beaumarchais displayed favor to the popular cause, and entered into speculations to supply arms and muskets. But his acts exposed him to suspicion; he was accused and acquitted; then accused again, and being obliged to run away, he escaped to England, and afterwards to Germany. He returned to France after the fall of Robespierre, and died in 1799.

In a newspaper of 1780, we read as follows: "Last Monday morning, at the Honorable, the Lord Viscount Colburn, being at New Tunbridge Wells, near Isington, had his pocket picked of a gold repeating watch of great value."

In "Scott's Magazine" for October, 1847, are the following lines on a Watch, by Mr. J. Byron, commonly called Dr. Byron, the creator of a system of shorthand; and who is to be found in his printed works. The same lines are attributed to T. Hall, in 1749. They appear without the author's name in the "Gentleman's Magazine" for May, 1749:

"Could but our tempers move like this machine,
Not urged by passion, nor delayed by sense,
But true to nature's regulating power,
No virtuous acts, no dignities, no honors,
Their health and joy would follow as they ought,
The laws of motion and the laws of thought,
Sweet health to pass the present moment o'er,
And everlasting joy when time shall be no more."

On the face of a very old watch, the outer case of which is of gold, of the finest workmanship, encrusted with precious

stones, is represented in enamel a landscape with a single figure, apparently that of a traveler. The sun is disappearing behind a range of mountains, and the legend round it is raised letters is, "Vada ex vengo ogni giorno, ma in andra sono ritorno." supposed to be addressed by the sun to the traveler.

In the "Gentleman's Magazine" for 1748 is an account of one the Marquis of Worcester's project, which was "a watch to go constantly, and yet needs no other winding from the first setting on the cord or chain, unless it be broken, requiring no other care but to be wound up when they consulted with, concerning the hour of the day or night; and if it be laid by a week together it will not err much, but the oftener looked up on, the more exact it shows the time of day or night." This seems to have been a project for a machine to measure time by perpetual motion—the will-o'-the-wisp of many mechanicians in all ages. In the same magazine for the following year, we find a suggestion to watchmakers, as to the construction of a watch which should move always without winding. The celebrated French physician, Pinel, relates the case of one of the most eminent watchmakers in Paris at the end of the last century, who was infatuated with the chimera of perpetual motion, and to effect this discovery he set to work with indefatigable ardor. Through unremitting attention to the object of his enthusiasm, his mind became completely deranged. He imagined that he had been guillotined, that his head had been mixed with those of some other victims, and that the obituary notice of this cruel verdict, had ordered the heads to be placed on their respective bodies. By some mistake, he conceived that the head of one of his mortal enemies had been placed upon his shoulders; and this idea haunted him day and night; but in his madness he zealously presented his endeavors to the obituary notice of the same, with the aid of watch-wheels and other mechanisms. A person of a lively and jocular turn was engaged to play the following trick upon him, and to the following conversation was directed: "The celebrated miracle of St. Denis, who carried his head under his arm, and kissed it as he went." "What a wonderful feat!" "The conversation was directed to the celebrated miracle of St. Denis, who carried his head under his arm, and kissed it as he went." "What a wonderful feat!" "The conversation was directed to the celebrated miracle of St. Denis, who carried his head under his arm, and kissed it as he went." "What a wonderful feat!"

In 1753, a watchmaker, who was also an astrologer, was living in Bloomsbury. About this time a base girl, named Elizabeth Canning, trumped up a false tale about a gipsy, alleging that under Bethlehem wall she was seized, robbed, and gagged, and thence dragged to Mother Wells's, and Edfield Wase, where she was nearly starved to death. The case caused great excitement for more than twelve months; but ultimately the girl was tried and convicted of perjury, and sentenced to seven years' transportation, on May 24th, 1754. A south-saying horologist, who had been in the case, and who had not lost his activity; but he was out in his reckoning, as will be seen by a comparison of the before-mentioned facts, with the following predatory advertisement, which appeared at the time:—

"As by an advertisement, April, 1753, I was confidently sure; from the nativity of Elizabeth Canning, that her case was certainly true; from two directions that came up at that time; one the Midwife to the Square Room; Lilly 670, viz, it produces the discontents of the commonwealth, thwarting and contention; by base and unworthy women; lost of honour; it produces the sentence of some magistrate or judge against the Canning; that her case was certainly true; from the opposition of Saturn; he is Lord of horrible mischief and tragical mischief; all manner of mischief that can be devised; a dire plot to conspire to the like effect, so as to prove it a truth beyond contradiction, testified by numbers of the most learned men from experience in all

C. F. A. HINRICHS,

29, 31 and 33 PARK PLACE.

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(Up-stairs)

NEW YORK

Successor to M. WERCKMEISTER.

(ESTABLISHED 1681.)

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Glass Ware, China, Bronzes, Clocks, Toys, &c.

Sole Agents for the GLASS FACTORIES of the COMPANY "ANN," Namur, Belgium
Depot for ARCHERY, CRICKET and BASE BALL IMPLEMENTS

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MORRISON'S Gold and Silver SOLUTION;

For Electro-Plating Without a Battery.

The Manufacturer offers the public Gold and Silver Solutions, made from Pure Gold and Silver by means of which plating may be done without use of a battery. They are so simple, that all can use them, and at a small expense.

Price List.—Gold Solution, \$3.00; Silver solution, \$1.50.

MORRISON'S JEWELERS' RESTORATIVE—For Cleaning Jewelry, Silver and Plated Ware. It accomplishes its object more effectually, and with less labor, than any other preparation, and is confidently recommended as a perfectly reliable article.—Price, 25 Cents.

The Trade Supplied by ARTHUR B. MORRISON,
Manufacturer and Proprietor, 521 Congress Street, PORTLAND, ME.

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The American Sterling Company



NAUBURG, CONN. NEAR HARTFORD

Manufacturers of Silver-Plated Spoons, Forks,
AND A GENERAL LINE OF PLAT WARE.

The base metal is AMERICAN STEELING METAL, of our own manufacture, which contains 20 per cent. of nickel, and being made by a process which renders it harder and tougher than ordinary 18 per cent. nickel, it is the best base now known for plating.

Our goods are plated with full weight of silver, and carefully watched before and after plating, and the amount of silver guaranteed as represented, and the goods warranted in every respect.

Office, Nos. 1 & 3 DEY STREET, N. Y.

CHAS. E. SPENCER & CO.

Gold and Silver Refiners

SMELTERS AND ASSAYERS OF ORES,

Jewelers' & Silversmiths' Sweeps, Polishings, &c.

147 MULBERRY STREET,

Four doors below Grand Street,

NEW YORK.

Sole Agents for Clouet's Machines and Process. Fine Gold and Silver for Jeweler's use.

ages; from the application of Mars to Jupiter the 30th day of this month; who is esteemed the Worker of Juno; I verily believe, and don't not, that Elizabeth Canning will be freed from all the dangers she labors under. JONAS HARRIS, Watchmaker, Bloomsbury."

When Dresden was taken, in 1757, by the Prussians, the immense wardrobe of Count Bruhl, the Saxons minister, was found to contain a different habit, with its appendages of watch, stick and snuff-box, for every day in the year.

Charles III. of Spain, who commenced his reign in 1763, established in New Castile a mechanical school, of which the avowed object was to form eminent proficient in the useful art of dialling and watchmaking; but a writer in 1809 tells us that up to that time it had not produced a single pupil. At the King's College at Madrid was also a school for mechanics, in which the pupils were particularly initiated into the mysteries of watchmaking, and early in the present century this institution was under the superintendence of the brothers Charost. However, the mechanical arts have never been held in high estimation in Spain, and when pursued there have not obtained much success. We do not find that it has ever supplied any important horological mechanism.

In the South Kensington Museum is a minute watch in the form of an apple, in a gold enamelled case, surrounded by a set of gold springs. The stem or handle is of gold filigree work. It is of Geneva manufacture, about 1760. It was purchased for 2*l.* 14*s.*

We read in the "Gentleman's Magazine" for 1762, under date May 30th, that "Mr. Peyton, dry fish monger, opposite the water house, London Bridge, received by the Chester stage-coach a parcel, carriage paid, this when opened appeared to contain a gold watch in a shagreen case, with a gold chain and a red cornelian seal set in gold, which had been given to his wife by her father, and had been lost between eight and nine years from her bedside. Immediately after the losing it Mr. Peyton made use of all common methods of endeavoring to recover it, by advertisements, hand-bills, &c., but to no purpose; till at length he had it in this manner most unexpectedly restored to him very safe, and without seeming to have met with any injury during the whole time it was missing."

The Economy in Jewelry Manufacture.

By G. M. S.

When the use of jewelry was confined to the rich almost exclusively, and only such articles were made as ordered by those who wished to use them, little attention was given to the saving of labor, and no value was placed upon the ingenuity which could devise a way to make a brilliant display at small cost, it was desired only to make something beautiful and substantial which could be worn and admired for years, possessing artistic merit and cunning workmanship; but gradually the use of jewelry has increased until it has become universally worn and is necessarily produced at a cost which brings it within the reach of all. The style has consequently altered, it being impossible to produce fine artistic articles at the required cost, in fact, it is not desirable to produce a thing of beauty to be a joy forever, but some odd, peculiar looking object which shall satisfy the whim of the moment, and the desire to possess something which shall be manifestly a novelty to every one who sees it. Not only in jewelry but in all things; in every department of life something odd is the universally desired; the preachers and lecturers who say odd things are the popular men; odd styles in furniture; odd shaped chairs, no matter how little they conform to the shape of their occupants, are the desired things; hats which appear odd; pull-backs; anything which from its oddity demonstrates to the beholder that there has been a recent change is sought for and finds a market, and such being the case the manufacturer who would be successful must follow the leading spirit of the times and produce such things as are odd, even if beauty be sacrificed.

Now, this constant demand for odd novelties places an increasing strain upon not merely the artistic abilities of the producer but his shabby ingenuity also, for having designed, after using all his powers of imagination to the utmost, some new style he purposes introducing, he has to devise a way to produce the article, with all its peculiar effects, at the lowest possible cost, so, that in fact, it shall appear of more value than really belongs to it, on account of the apparently intricate labor bestowed upon its production, consequently manufacturers are always wanting to secure the services of men who can originate novelties, and tell how to make them; now, the idea at once suggests itself, that, perhaps, the best method of developing such men and turning them to the best account is not always adopted, and, also, that possibly such men are not being produced under the present mode of apprenticeship.

In the first place, the manufacturer ought to consider whether he makes it worth a man's while to cultivate such abilities as he possesses and use them for his benefit. Here the question at once arises, how can we urge men to endeavor to design and invent novelties or improvements, and how to show appreciation of their success without creating jealousy of their fellow-workmen? Suppose a premium were offered for the best, novel, original designs for a given article, the money gained would be an inducement and reward that many would consider an honor to obtain. Of course, as premiums are scarce, altogether too much so, unfortunately, among mechanics, but a system that would promote aspiration might induce a growth of intellect and ability. Make a man in some way interested in his work and the success of his employer, and he will not look longingly for the hour hand to point to six.

There are many employers who will not admit to a man who works for them that he has made a success, nay, they will try to hide the fact from him and deny it if possible, lest he should ask larger pay. Verily "there is that withholdeth more than is meet, but it tendeth to poverty."

Good workmen are always the cheapest to the employers, they usually work more rapidly than inferior men, and therefore a smaller number are needed, less shop room is necessary to turn out a given quantity of work where good smart workmen are employed, less gas consumed and smaller expenses in general incurred, and as the jewelry business is fortunately free from any trade union, men are not necessarily paid all alike.

Probably, if all things are well managed about a factory, and the work so inspected that faults are not overlooked, the most satisfactory way to pay workmen is, by the piece, this gives a man personal interest in his work, and every intelligent man knows that the cheaper a thing is put on the market the greater the demand will be, so it is to the workman's advantage to devise means to facilitate production.

With respect to the apprentices now working at the business, few are really learning it properly, because few have good teachers. First principles are apt to be entirely neglected. In most factories a boy learns as he best can, it is not anybody's particular business to instruct him, and no one tells him any more than just enough to enable the boy to render some desired assistance.

The apprentices in jewelry factories ought to be taught how gold is alloyed, solder made, coloring done, and in fact, everything as far as possible which will be useful should be ever enter upon the business of manufacturing when grown up, but no, all such makers are studiously kept by the few who understand them from everyone with whom there is a shadow of a chance of their coming into competition. The result is, the boy sees his chances of really understanding the business are very small, and the best he can do is to get as well paid as possible during his apprenticeship. Under such circumstances we ought not to be surprised when we find good, intelligent help hard to obtain, even during the present dull times, and aspring men extremely rare always.

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No. 47 NASSAU STREET, NEW YORK.

Largest Stock in the country of ALL articles, either real or imitation, suitable to be set in Jewelry; Also, Importer of Enamel for Gold and Plated Jewelry, Gold Shells, Silver and Copper Foil, &c.

SPECIAL ANNOUNCEMENT.

WE beg to advise our friends that having reduced to the lowest figure our prices on our whole stock of CORAL JEWELRY, including the very latest novelties of the Neapolitan market, we are compelled to decline to consign any of these goods this season. We offer to CASH PURCHASERS unprecedented advantages, and earnestly solicit their orders.

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Consisting of PAPER BOXES of Every Description,

JEWELERS' CARDS, MERCHANDISE TAGS, CHAMOIS SKINS, TISSUE PAPERS, PINK & WHITE COTTONS, (Shirts & Bags), TWINES, &c.

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Walking Canes,

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No. 18 JOHN STREET,

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The manufacture of specialties is becoming a prominent feature in the business, and undoubtedly it has many advantages; a manufacturer who gives his whole attention to some particular branch can more thoroughly exhaust the changes which can be introduced into it and the mechanical devices for its cheap production than if engaged in making, in a desultory sort of way, anything which may be suggested, but it requires much careful care to determine just how far a line of goods may be run profitably, and a considerable amount of ingenuity to devise the perfect production of goods, and the right thing to take the place of that which begins to run out. In fact, the manufacturer to be successful must never allow the market to find him in such a position that he has not anything to meet its demands and foresight is required to know under existing circumstances what the market will absorb.

It is certainly rather to the disadvantage of apprentices for manufacturers to adhere to specialties, but still this does not destroy the opportunity for them to learn the first principles and knowledge of which forms the foundation of their success in after life.

That successful manufacturing depends upon the studiosity and degree of education and experience none can doubt, but to maintain and exalt the character of our productions, demands constant attention and necessitates the employment of intellectual and skilled labor and the proper development of learners for future use.

Engraved Gems.

HISTORY OF THE GLYPHIC ART.

By C. W. KING.

The point next to be considered, namely, the motive dictating the choice of the sign-types, may possibly derive some elucidation from certain historical conditions already alluded to. The royal line of the Asiatic Tyrinns had its name in the San-donn, which patronymy the Greeks rendered by the equivalent Heracleids, substituting, with close accuracy, the Hellenic Heracles for the Assyrian Sandonn. This tradition is alone enough to account for the continual appearance in Etruscan art of that demi-god, in a semi-greened shape, it is true, but retaining his national Assyrian weapons, the metal mace (not the more picturesque club assigned him by latter art) and the bow. This he figures more especially upon the gems of the earlier times. The Florentines, the

"popolo maligno"
"Che discende da Prodo al antiquo"

preserving the ancestral tradition, still retain Heracles for one of the supporters of the City Arms, the other being his lion under his strange-sounding, perhaps original name of Marzocco; a figure certainly continually repeated, and much the same relation to each other, upon the cylinders of their Assyrian progenitors.

The origin of the royal line solves the mystery, wherefore the lion should have been as great an Etruscan as he is now a British institution, from the time when Meles, their ancient king, carried him the monster-bird of his concubine—round the walls of his new capital, Sardinia, at the bidding of the oracle, so to render it inpregnable; why his figure should have crowned the tumulus of every Linciano; should have been the favorite impress for his signet—the finest Etruscan ring known, the Casino (British Museum), is modelled into the forms of two lions supporting a frame containing the royal coat of arms, in its turn with a lion regardant—and finally why "Evivva Marzocco" was the Florentine war-cry down to the very extinction of the Republic.

One peculiarity difficult to account for, although hitherto unnoticed by any who have treated of Etruscan art, his arrested attention while examining the engraved, as his casts from scarabæi which I have had occasion to study whilst investigating this very interesting division of my subject. This peculiarity is the fact that the limits within which the gem artists of Etruria have confined their choice of things and personages to be engraved upon the scarabæi, and which they never seemed

to have overstepped so long as this form of the signet continued in fashion. The question soon occurs, whether this is of importance; it is not improbable that, by directing the attention of archaeologists to this point, some valuable results may accrue, bearing upon the first colonization of Italy and the introduction of the arts of design into that country.

The first and by far the largest class of scarabæi with the rude designs in drill-work already noticed (and which may safely be assumed as the productions of the first ages of the Etruscan commonwealth) present the collector with subjects rarely having any mythological import, nor attempt the representation of an event in fable or action requiring the introduction of two figures. Fantastic animals, like those on the graffiti, the gryphons, winged lions, etc., clearly indicate the Eastern origin of the notions embodied on the gems: Fauna based about some Bæothic ceremony (fauna and nymphs are spoken of by Evander as the aboriginal population of Latium) or else Heracles, who figures in works of this style, to the entire exclusion of other deities and heroes,—sometimes in the posture of defence, resting on one knee and brandishing his club, or letting fly an arrow; sometimes rushing forward to an attack, or engaged in the chase, and holding aloft some huge beast, the trophy of his success; or lastly (what his worshippers must have thought a favorite amusement of the demi-god), to judge from its frequent repetition) floating along upon a raft borne up by Amphora, now steering it with his club and holding up an empty wine-skin or bowl to serve for a sail, now extended hopelessly drunk upon his back. This last notion is a curious one, for it seems to have been imported from the Nile (along with the little idols found about Vale), on whose floods rafts buoyed up are even now known to be put to sea. Juvenal also notices the "Antyphrasia" of the Nile.

"On benches of pottery were to spread the sail
And push with oars their varnished vessels frail."

Dionysus, "the Drunken," seems to have been in view these bacchanalian voyages of Heracles, in the lines quoted by Athenæus.

"Some carrying wine, the Bæothic crew increased,
Rowers of cup, and sailors of the feast."

And the famous voyage of the same hero in the borrowed cap of the Sun, the mystery involved in which traditions have the fertile source of discussion traced the later mythology, may perhaps have had its origin in the commonplace expedient depicted by the ætæalæ engraver. Other scarabæi bear the emblems of his different labors, the Nemean lion, and the triple-headed giant Geryon; and again allusions to his imitator Theseus in the figure of the Minotaur, a man with the head only of a bull.

The rings with hollow faces made out of thin gold-plate, and evidently intended as mere ornaments, and not as sacred tokens (for which their slightness renders them unsuitable), exhibit devices of a yet more marked Asiatic character, in their form, and in the sacred trees, so strongly suggestive of Assyria. As none of the graffiti manifest in their designs any influence of Greek ideas, they may justly be put down to the account of the original Lydian colonists, or their fellow-settlers, the Asiatic Pelasgi.

But in that other class of scarabæi characterized by the extreme finish and minuteness of detail already pointed out as its distinctive marks, we meet with pictures of events taken from mythic history, and of persons and actions of the highest importance. Pausanias's description of the same scenes in the ivory bar-reliefs panning the Coffin of Cypselus (Elæus L. 17.). Now if Cypselus actually dedicated this coffin (his hiding-place in infancy), and there is little reason to doubt the truth of the old tradition, these carvings must have been done sometime before he was 400, or, at the latest, the usurping the supreme power at Corinth. He belonged to the indigenous Eolæi stock ("being a Lapth and descendant of the Carian actors") and his countrymen, the Bæothians, whose rule he overthrew were the Doric conquerors who had changed the original name of the city, Ephyræ into Corinthus.

Don't fail to read the last part of J. H. Johnston's Advertisement.

It will be seen that he is able to fill all orders before Christmas.



"Taking advantage of the Situation."

Size 13x17 inches; Printed in 13 Oil Colors.

The above cut represents the most popular and mirth-provoking picture ever issued in the interests of the jewelry business.

The old gemmer is so absorbed in viewing the novelties of the season, that he is perfectly unmindful of the fact that a little boot-boss is "taking advantage of the Situation" by stealing a smoke. The chromo displays very much more character in the countenances of the figures than it is possible to attain in a wood-cut; in fact, all the accessories are very much more finely carried out than it is possible to show in a cut.

This picture has done much to attract attention to my place of business, than 15 years of persistent advertising had done, and the steady increase, month by month, in my business this year over last year, I can trace to no other source. In saying this I do not refer to the sale of the pictures, for that I keep separate and distinct from my business, but my cash sales have steadily increased every month over the corresponding month of last year, amounting to the aggregate of several thousand dollars more.

There is no reason why one jeweler in each town and city in the whole country cannot reap the same benefit from these pictures, for they are furnished in large quantities at a low price, with the name of each jeweler printed on the chromo, the same as my own name and address is. With your name and location printed on one, and given to a friend, it will be a live advertisement for many years to come; and if placed in hotels and other public places, they will do more good than ten times their cost spent in ordinary advertising; and if you keep one handsomely framed in your window, it will be sure to attract more attention than anything you ever had.

In order to increase the sale of these pictures, I have adopted the following plan: Having a pair of diamond earrings, weighing over 20 carats, which cost to import \$4,000 in gold, and retelling \$4,000 of these unique pictures at \$2.00 each, and give the diamonds to the 4,000 purchasers of the pictures, and as I cannot legally sell numbered tickets, I have entered in a book numbers from 1 to 4,000, and in the receipt of each one of these numbers I will enter them as they arrive, and will immediately mail a Postal Card to each one, with their number on my book.

When all are sold, I will place the diamonds in the hands of D. H. Hopkinson, Jr., Editor of the Jewelers' Circular, and he will place them in the hands of the person who has the large commission, and they will decide in what manner the ownership of the diamonds shall be determined upon.

Whether I will carry out this matter in honor is the main question with every one who studies me \$2.00. That I will do so I think will be doubted by no one who reads the following.

We, the undersigned, having known Mr. J. H. Johnston for the last fifteen years or more, have no hesitation in saying that we believe that any matter of business undertaken by him will be carried out to the letter, and that any statement made by him may be implicitly relied upon.

WHEELER, PARKSON & HAYES, 3 Maiden Lane. VILKINTEY JEWELRY CO., Jas. V. Schoemaker, 191 Broadway.
SUTHER & HINDS, 1 Maiden Lane. WHITNEY M'F's Co., C. E. Bailey, Pres't, 181 Broadway.

BAKER, STEELE & CO., 9 Maiden Lane. CARPENTER, HOBBS & SLAUS, 1 Bond Street.
SHELDON & HARRIS, 9 Nassau Street. CHAS. CASPER, Pres't, 61 Bond Street.

MORGAN SILVER PLATE CO., Chas. Casper, Pres't.

GILMAN M'F's Co., 11 Bond Street.

And I do not hesitate to refer you to any one else in the trade here in New York, by the most of whom I am well and favorably known.

By sending 20 cents extra I will print your name in place of mine, as seen in the cut, and for 25 cents additional will mount it, ready for framing. And if you order 5 or more, I will print your name and the date of the cutting of the diamonds.

We are often asked: "When are you going to get this thing out?"

"We are striving to close them all out by December 31st. We have received orders from jewelers from almost every State and Canada, and some have ordered a dozen more after receiving the first one, and we hope this month to receive very many orders by the dozen. Orders received in-day will be shipped at once, and the 25¢ extra will be returned to the readers of this number of the Circular, if they order at once, can receive their Chromos before Christmas.

A liberal commission will be allowed for selling them, if ordered by the dozen.

J. H. JOHNSTON, Watchmaker and Jeweler,
No. 150 Bowery, New York.

Dealers who are not yet subscribers to the JEWELER'S CIRCULAR, the organ of the Jewelry trade, may order to this office \$3.00 will be entitled to receive the picture and the copy of this number of the Circular mailed regularly each issue for the term of one year: from date of subscription, and will participate in the above plan offered by Mr. Johnston.

D. H. HOPKINSON, Editor, No. 309 Pearl Street, New York.



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FINE ELECTRO-PLATED

Table Ware

OF EVERY DESCRIPTION.

Would call especial attention to their new

Patent China-Lined Ice Pitchers.

Factories, TAUNTON, MASS.

These Pitchers are made of the finest quality of white metal, heavily plated with silver. They are finely engraved and chased in a great variety of decorations. The linings are of fine stone china. The top is secured to the body of the Pitcher in such a manner that can be easily detached and the lining removed for cleaning or other purposes.

Many improvements attained are noticeable in these Pitchers. Water and ice standing in them do not come in contact with any metal whatever. They are perfectly clean, and easily kept so. They are perfectly free from all odor or rust. Lemonade, beer, milk, etc., may be kept cool in and drank from these Pitchers without endangering health. There can be nothing cleaner or purer for holding liquids than pure, white china. There is no possibility of leakage. The construction of the Pitcher is such that the linings can easily be replaced at a very small cost.

Salesroom, No. 2 MAIDEN LANE, NEW YORK.

LEO HAMMEL.

LOUIS RUNKEL.

L. HAMMEL & CO.,

Importers of Materials and Tools,

FOR WATCHMAKERS, JEWELERS & ENGRAVERS.

SPECTACLES, OPERA, FIELD & MARINE GLASSES,

Telescopes, Microscopes, Watch Glasses,

SILK GUARDS, OPTICAL AND FANCY GOODS.



Observe the

Trade Mark.

SOLE IMPORTERS OF THE CELEBRATED

Dennison and Gravier Mainsprings.

No. 9 Maiden Lane, New York

Keep constantly on hand a fine assortment of Cutting Engines for stem-winders' wheels and others, Round-up Tools, Universal and Jeweling Lathes, plain and combined, and all styles of new tools in general.

Grand Headquarters!

ESTABLISHED 1850.

M. J. Paillard & Co.

MANUFACTURERS & IMPORTERS OF ALL KINDS OF

Musical Boxes

OF STANDARD REPUTATION.



—AND—

Fancy Musical Goods,

Specially designed for the requirements of this market.

DECIDED IMPROVEMENTS.

(PATENTED.)

M. J. PAILLARD & Co.'s INTERCHANGEABLE AND SELF-ADJUSTING CYLINDERS for increasing the number of airs and rendering the instrument capable of many changes in tunes and melodies (with but a slight additional expense.) This invention is a marvel of mechanical ingenuity, and has achieved a wide spread reputation.

THE NEWEST FEATURE

is the GRADUATING SCALE, an improvement recently introduced and patented by us. This invention consists in combing the cylinder with two or more segments of combs of graduating notes, the vibration of which are of similar pitch, producing a clear and distinct harmony of sound never before attained in the old style of boxes.

Our Repair Department.

Skilled workmen, specially educated in intricate repairing, are employed in our establishment, and all damaged or injured instruments entrusted to us for repairs will be put in workmanlike order at a moderate charge.

Buyers coming to New York are invited to examine our stock—the largest in the city.

M. J. Paillard & Co.,

No. 680 BROADWAY, NEW YORK.

SPRING TRADE, 1875.

AIKIN, LAMBERT & CO.,

No. 12 MAIDEN LANE, NEW YORK.

**Choice
Gold Pens.**

Have in stock, and are manufacturing a large assortment of first-class Gold Pens, consisting of long nibs, short nibs, fine pointed, coarse pointed and angular or oblique pens. All of which will be furnished with soft, springs, or hard temper as may be required.

**Assortments
in
Show Cases.**

Assortments arranged in handsome trays, and pen signs furnished to regular agents. Being disposed to meet liberality with liberality we have originated and gotten up Metal Show Cases of sizes and styles to the wants of our patrons, who order sufficient goods to make a creditable display. Others are compelled now to follow our lead, acknowledging us as "Leaders of Fashion."

Rich Jewelry.

We are also manufacturers and dealers in solid gold and rolled plate jewelry all of which being intended for the Jewelry Trade, proper will be found reliable.

Rings.

Diamond, Amethyst, Topaz, Pearl and Stone Cameo Rings.
Chased, Engraved and plain Band Rings.
Sold 18kt. and 14kt. plain Rings.

Chains.

Filled Rings of all saw styles.
Vest, guard, and other styles of Gold Chains.
Gold Sets, Pins, Cuff Buttons, Studs, Ladies' and Gents' Jewelry.

Paul Breton**Perfect.
Reliable.
Excellent.**

New goods sent on selection when required.
Watches have been introduced for some 10 years and numbers of them have been sold. By inviting criticisms from the several master-minds in America, as well as in Europe, we have now a watch perfect in its proportions, reliable in its actions, made of the best materials, and in short, the best watch for the money offered for sale; energetic competitors will endeavor to force their goods that the Paul Breton's may be displaced, but the testimony of those who have experimented is, that for assured continued excellence the Paul Breton is the watch.

Montandon Freres,**Something
New.**

of Locle, have just sent out an invoice of their movements, gotten up under our direction, with *Estell's Patent Regulator* and *Patent Safety Barrel*. Something entirely new.

Chas. Latour Standard Watches.

are the quartz-plate in style and full-jeweled; have tempered brasssprings; good balances, and are Standard Watches at low prices. Will have dial, hands, springs, etc., for repairs.

Gold Cases

As well as Silver Cases made to order. Those desiring best gold, and the height of style, will please communicate with us.

One Ladies' Case for Four Different Movements.

We make the patent "compromise cap" to our ladies cases, by which the same case can be used for the Elgin, Waltham, Latour, or Longine movements. Dealers visiting this city are requested to call and introduce themselves. Those desiring to write us will address

JAMES C. AIKIN,
HENRY A. LAMBERT,
WILLIAM W. STEWART,
JOHN B. SHUB.

AIKIN, LAMBERT & CO.,

12 MAIDEN LANE, N. Y.

DERBY & HALL,

MANUFACTURERS AND PROPRIETORS OF

WILLIAMS & COOK'S DUST PROOF WATCH KEYS.

Patented September 1, 1874.

**PRICES PER GROSS:
THE POPULAR NAME KEY.**

Style A, gilt handle and Nickel plated pipe..... \$12.00
Style B, gilt handle and plain pipe..... \$11.00
Style R, nickel top, 75 cents per gross extra.

ENGLISH PATTERN KEY.

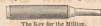
Style C, Nickel plated handle and Pipe..... \$7.50
Style C, gilt handle and Nickel plated pipe..... 7.00
Style C, gilt handle and plain pipe..... 6.50
Style D, nickel top, 75 cents per gross extra.

In ordering Name Keys please write name and address plain so as to avoid mistakes.

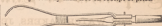
If anything different from "Watchmaker and Jeweler," or "Watchmakers and Jewelers," is required upon the back of the Name Key, \$1.50 will be charged for extra die. No first order for Name Keys to be less than three (3) gross without extra charge of \$1.50 for die. Any other order has been filled for Name Keys, the same prices may order any number of gross without extra charge for die. Our keys are all American made, with WILLIAMS & COOK'S Patent Perforated Pipe, warranted to be made of the finest quality of steel, and are absolutely dust and moisture proof, constituting by far the best and cheapest key manufactured. Our keys run from 1 to 10; 1 being the largest size, 3, 4 and 5 being the common sizes for American watches.
Twelve ordering goods will be preferable in marking style by letter, and also pipe by figure.
The Plain Key without the Patent Dust Cleaner can be furnished, if desired, at 1 cent per gross less.
For sale by the Trade generally. Manufactured by

DERBY & HALL, Bellows Falls, Vt.**A. N. CLARK,**Manufacturer of Light Hardware,
PLAINVILLE, CONN.

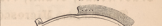
[37] Samples of the following Nickel Plated Watch Keys sent by mail free on receipt of price.



The Key for the Million.

Patented October 19th, 1874.
Combination Watch Key, Spring and Tweezer.

Key for the Million.



Key for the Million.

Combination Watch Key & Envelope Opener, Pat. Dec. 17, 1871

New Four Hole Case Spring, Pat. July 16, 1874.

Key for the Million,.....	per dozen, 75 cents; retail 15 cents
Watch Key, Charm and Envelope Opener.....	\$2.00; " 35 "
Watch Key, Ear Spoon and Tweezer.....	1.50; " 25 "
Key for the Million,.....	per dozen, 75 cents; retail 15 cents
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Watch Key, Charm and Envelope Opener.....	\$2.

American Clock Co.

HINE & THOMAS,

581 BROADWAY, N. Y.

No. 172 State Street,

CHICAGO.

No. 520 Market Street,

SAN FRANCISCO.

SOLE AGENTS IN AMERICA FOR

E. N. Welch Mfg. Co.

New Haven Clock Co.

Seth Thomas Clock Co.

Welch, Spring & Co.

Seth Thomas' Sons & Co.

And A. S. Hotchkiss' Tower Clocks,

MADE BY THE SETH THOMAS CLOCK CO.

Catalogues and Price Lists Furnished the Trade.

NOTICE.

We shall hold ourselves in readiness to fill **promptly** orders by telegraph for Clocks, from either of our Catalogues, which may be wanted, by express, for the Holiday Trade.

AMERICAN CLOCK CO.

No. 581 Broadway, New York,

December 1st, 1875.

SEVENTH VOLUME

OF THE

Jewelers' Circular & Horological Review,

SUBSCRIPTION, \$1.25 PER ANNUM.

With the coming year the JEWELERS' CIRCULAR will enter upon its SEVENTH VOLUME. This long record, so uniformly marked with the approbation and esteem of the Trade, affords a substantial pledge for future confidence.

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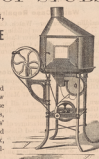
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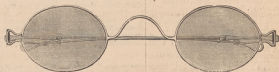
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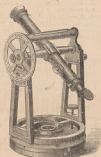
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Practical Hints on Watch Repairing.

By EXCELSIOR, No. 10.

(150) We will now consider the form of a terminal curve required to suit any particular case. Remembering that the function of these terminal curves is to ensure the hairspring to strike up more rapidly than it would do if all the coils were left in their normal size, it is obvious that the longer the curve is, the more slowly and gradually will the spring increase, and, on the contrary, the shorter and more compressed it is, the stiffer it will be and the more rapidly it will cause the whole spring to strike up. (I trust professional readers will pardon my scientific expressions, as I wish to make the matter plain even to the most inexperienced.) Therefore, if the watch loses in the long vibrations, as compared with the short ones, the strength of the spring does not increase fast enough and the terminal curve is too long and weak. If therefore shorten it by holding a portion of it out into the normal coil, and commence the inward sweep at a point nearer the work— or nearer to the collet, if we are studying at the collet end. For instance, if the curve was like C A, Fig. 8, (see section 149) we shorten it up like to B E, drawing a new gauge by which to form it. If slight change is needed, the old gauge will serve well enough to show the alterations. This will cause the strength of the spring to increase faster, and quicken the long vibrations.

(151) But if the watch gains in the long vibrations, the spring stiffens up too rapidly and accomplishes the long vibrations too soon. We therefore make the curve longer and weaker like B E, Fig. 2, or at any length between C A, Fig. 8, and B E, Fig. 2, that we may think necessary to reduce the ratio or increase of the curve sufficiently to accomplish the long vibrations as slowly as the short ones. This is done by taking more of the normal coil into the curve.

(152) This is the whole secret. The isochronism is obtained by changing the length of the terminal curve, until the spring stiffens up in the proper ratio, making the long and short vibrations in the same times. This shape of the curve must correspond to its length, (148), in order to render isochronism possible, (152). Therefore, when we lengthen the curve by taking a portion of the normal coil into it, or shorten it by retaining a portion of the curve to the normal coil, as the case may be, the shape of the whole curve should be slightly changed to conform to its new length, as prescribed in sections, (150 and 151). This, however, is very easily done, as we shall see.

(153) But if the difference of times between the long and short vibrations exceeds a few seconds for 24 hours, the total length of the hairspring should be changed in order to correct it,—unwinding and taking it up to make the long vibrations quicker, or letting it out to make them slower. In such cases, bend the curve so that the new place of attachment to the stud (or collet) will come naturally in the hole. This change of length, of course, changes the rate of the watch in both long and short vibrations, but a comparison of the two will show the effect upon the isochronism. That being found correct, the rate of the watch is a matter to be corrected by regulating it. This distinction between the isochronism should be clearly understood. Of course, if we find that in securing isochronism we have changed the rate so much that we cannot regulate it, we shall have to substitute another spring of more suitable strength. But after a spring is isochronized closely it must never be taken up or let out to get correct time, for that would destroy the isochronal adjustment at once. The proper method of correcting the rate, by making the balance lighter or heavier, changing the screws, etc., will be treated in the article on Regulation.

(160) A word of caution is necessary here. Whenever we find a considerable error in the isochronism, and especially when there is a gain in the long arcs, we

should, before altering the spring, ascertain whether there is not some abrupt change of direction in the curve, or irregularity in the form, so that it does not all come into action uniformly. If so, this must be corrected by another trial made, as, where a part of the curve acts imperfectly, or during only a portion of the vibration, error will result. As for the terminal curves we often find in cheap work, and which are not correct at all, but consist of a number of "kinks," or bends, serving to bring the end of the spring into the normal place of attachment, we can only say that, while they may be better "no curve at all," it is impossible for them to give fine results, and the workman who will now consider secure such from them would only waste his time. Another point is, that all springs, after a change of shape, have a tendency to return more or less to their previous form, and this settling back must be first gone through with before permanent trustworthy tests of the effect of the change can be made. In the preliminary and coarse alterations the test may be had once, but as we approach closer to correctness it will be necessary to wait at least three or four hours, or over night, before testing. The watch should be kept running during the settling-back process, as the vibrations hasten the completion of the change in the spring. After that at correct isochronism, the watch should be brought to exact time, then finally make another test of the isochronism, to discover if any further slight reversion has taken place during the interval.

(161) Having shown the proper forms of the firm of the terminal curve, and the different ways we will now consider the means of making them as we want them. We will take up the helical spring first, as the curves are more easily applied to it, closely with the longest spring, which also requires an elbow, in order to permit the application of the curve. In fitting a helical spring, the order of proceeding is, first, to try our spring with the Upright Holder, as in section (62, 63), before lengthening either end, to find whether the number of coils which gives about correct time is 24 or not, or for that matter at one end, to dispose between the plate and the balance-bridge, nor too few for a good action (22, 24, 35). Then, and pin in the lower terminal curve, (147), and pin it to the collet-bar at the next, try it again in the Holder to find the place at the upper end which gives correct time, hold it there, and test for isochronism.

(162) If it is nearly correct, the point at which the coil is held in the clamps of the holder is to be the end of your upper terminal curve, and the place of its attachment to the stud, leaving exactly the same amount of spring outside of the stud as was outside of the clamps, irrespective of the width of either. By "outside" I mean the end of the coil, the clamps—although it is on the side next the body of the spring. But if a three or four hours' test shows several seconds difference between the long and short arcs, the spring must be shifted in the clamps till the isochronism is nearly perfect, when the point then in the clamps of the holder for the end of the curve, whose length and shape, like those of the lower curve, you will decide upon according to your judgment, guided by section (147). If the rate given at that point is too far from right to be conveniently corrected by the balance (160), the spring is unsuitable. Having found this point of approximation correct, the spring should be marked, then break off the superfluous length of spring (leaving at least a quarter of an inch for safety), in such a manner as to bring its end to the same radial line as the point of attachment to the collet-bar, i. e., avoid fractional parts of coils, and pose the balance (74, 75), making the adjustment of the point by filing the collet-bar as required. This should be very carefully done, as you cannot pose the spring and collet after you have once changed the upper coil from its circular form (147), but must remove the spring and collet from the balance in any subsequent test of the point of the latter. You may now again break off any unnecessary spring, leaving a little for

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Curiosities of Clocks and Watches.

By EDWARD J. WOOD.

One of the Lords Aston, of Forfar, was a watchmaker in 1763, and it is said that the Earl of Cockburn descended from John Pezys, citizen and clockmaker of London.

At a meeting of the Archaeological Institute, held on July 30, 1863, the Earl of Mansfield exhibited several exquisite miniatures upon watch-cases of the last century. Among these paintings were portraits of the unfortunate Queen of Denmark, Caroline, sister of George III., and of the famous Stresemann, Prime Minister of Denmark, who was executed in 1772 for an intrigue with the queen.

On June 4th, 1764, the celebrated watchmaker, Arnold, of Devonport Court, in the Strand, presented to George III. a curious Lilliputian repaying watch of his own manufacture, set in a ring. The size of the article did not exceed that of a silver two-penny piece. It contained one hundred and twenty-eight parts, but altogether weighed not more than five pennyweights seven grains and three-fourths, while were thus minutely subdivided. The movement consisted of two pennyweights two grains and one-eighth; the great wheel and faze, two grains and three-fourths; the second wheel and pinion, three grains and one-half; the third wheel and pinion, the ninth part of a grain; the fourth wheel and pinion, the tenth part of a grain; the cylinder wheel and pinion, the tenth part of a grain; the balance, pendulum, cylinder, spring, and collet, two-thirds of a grain; the pendulum spring, the three-fourth part of a grain; the chain, one half of a grain; the barrel and main-spring, one grain and three-fourths; the great wheel and ratchet, one grain; the second wheel and pinion, the eighth part of a grain; the third wheel and pinion, one-eighth part of a grain; the fourth wheel and pinion, the fifth part of a grain; the fly-wheel and pinion, the sixteenth part of a grain; the fly-pinion, the twentieth part of a grain; the hour-hammer, half-a-grain; the quarter-hammer, half-a-grain; the rock-chain and pallet, one grain and a third; the quarter and half-quarter rack, two-thirds of a grain; the quarter and half-quarter snail and common pinion, two-thirds of a grain; the all-toothed piece, half-a-grain; the two motion-wheels, one grain; the steel dial-plate, with gold figures, three grains and a half; the hour snail and star, half-a-grain and one-eighth.

For this delicate and exquisite specimen of art Arnold had to make nearly all the tools that he used in its manufacture. This tiny watch contained the first ruby cylinder ever made. The king was so pleased with this mechanical wonder, that he presented the donor of it with five hundred guineas as a recognition of his artistic skill. Some time after, the Emperor of Russia, having heard of the king's watch, offered Arnold one thousand guineas if he would make another like it for him. This Arnold refused to do, so that he might not depreciate the value of his gift, but allow it to remain unique.

The "Annual Register" for 1770, and the "Gentleman's Magazine" for 1771, tell us that on Christmas Day in the former year Mr. Arnold, a watchmaker in St. James's Street, presented to George III. a small repaying watch in a ring, the all-toothed piece which was made of an Oriental ruby. Its diameter was the fifty-fourth part, and its length the forty-seventh, and its weight the two-hundredth part of an ounce.

Mr. S. Addington has a large oval watch, composed of two pieces of rock-crystal of octohedral form, three inches long and three inches wide. The dial shows the hours only; the bell is placed between the dial and the works. It was made at Lubeck, and is said to have been sent to Louis XIV. by William de Eresby as a gold watch, with a painted enamel back, and portraits of two children and a dog; with gilt chateaux of chased figures and Louis XIV. scrolls.

The maker was Augustin, of Vienna. Mr. J. G. Gardner has a gold watch, made by Graham, of London, the outer case being

response with Ulysses and Penelope and Louis XIV. scrolls.

In 1763 was published "Mechanics and Platen; or, the Watch spiritualized," by John Martin, watchmaker, of Spalding, Lincolnshire. The work purports to be a dialogue between the persons whose names are made to it. The following extracts from it relate to the watch, the rest of the book being made up of religious reflections, which are more or less pertinent. The author afterwards was the pastor of a Baptist congregation in London; and he was the writer of numerous religious works.

Even he proposes to discourse upon the watch, and its similitude to religious matters. Mechanicus consents, and they thus converse:—

Mo. First, then, let us consider the materials made use of.

Mec. Except the gilding, the whole is brass and steel; which, being but composition, reduces it to copper and iron.

Mo. Had we beheld the course and straggling particles, torn from the bowels of the earth, would it not amaze us to think of the strange revolution they must sustain ere they could possibly make the appearance they now do?

Mec. So, when this more noble matter, the human body, is well considered, &c. If we are surprised at the perfection of your watches, and that is increased by seeing it in the womb of the earth, how shall we express ourselves in consideration of this glorious display of the unlimited power of the Most High! In what condition do you receive the watch at first?

Mec. I know not better how to inform you, than by saying all things are ruff'd out, yet everything is incomplete. The callipers drawn, but the distances of the holes through some wheels too shallow, others too deep. The movements made, yet the wheels are rather forced than fitted in the frame. The motion is the same; and even dial-plate, spring, chain, and every other article is more or less imperfect.

Mo. A lively representation of the case of man, as being a descendant of Adam. In this state, if I may be allowed the expression, all is but ruff'd out, and nothing fitted for spiritual performance.

Without a second stroke (the finishing stroke) what are the works of any individual? You speak of wheels in this state being rather forced than fitted: so is it with them; all their doings proceed from slavish fear, not from love. If you added weight, would not that be sufficient to make it perform?

Mec. No; for meeting each other, no one will give way, the more substantial parts would crush the weaker to pieces.

Mo. Is it not thus with carnal men? Let your reproof be weighty, and it will be found unreasonable; and thus the Lord sets in, ineffectual.

When finished, I suppose, these difficulties are removed.

Mec. Wheels set: pivots are made, holes sized, wheels set of a proper depth, spring hooked in and adjusted, the verge finished, pendulum-spring put on, and the whole sets with much freedom and ease, and produces the lively motion you now see.

Mo. Thus when the Lord comes in a way of mercy, &c. the wheels of obedience are oil with love. Pray does not the man-spring take possession of that little box?

Mec. It does; and with it, the barrel arbor.

Mo. By this I understand, the watch is enabled to answer the purposes designed.

Mec. Your conceptions are very just: it is indeed with great propriety called the mainspring. The most elaborate performance without this is as useless as I am no longer than while it exerts its power, may we expect to receive any satisfaction for our labor.

Mo. What the mainspring is to the watch, that, and no more, is Christ to believers.

Mec. That it is a hidden spring, may make it also applicable to Christ.

To be continued.



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The Art of Etching.

SOME ACCOUNT OF WILLIAM UNGER AND HIS WORK.

(From the *January International Review*.)

All readers who take an especial interest in the fine arts, and many who do not particularly concern themselves about art, are aware that during the last few years a kind of engraving on metal by the help of acid, which we call etching, has been revived in Europe, and is now followed with much industry and enthusiasm by a few eminent artists and many inferior ones. For the sake of those readers who may happen to be interested in practical art questions, we will try to explain briefly what etching is, and in what it differs from engraving with the burin, before entering upon the study of the distinguished artist whose works will shortly occupy our attention. "Etching" comes from the German "ätzen," and means eating.

It is engraving by eating, and some sort of acid is the etcher. It is important to remember this, because people have fallen into the habit of calling penman's "etchings," and they are not. The essence of an etching is that it should be corroded—corrosion and etching, by their etymology, means the same thing. The etcher will, perhaps, kindly forgive this little piece of etymological pedantry for the sake of accuracy in the use of language. It is especially desirable that any particular work in art is not allowed to undervalue the importance of technical conditions. He may say to himself,

"These conditions do not concern me, who am not a practical worker; they may concern artists, but I have nothing to do with them; what concerns me is the mind of the artist and not the matter he works with." The answer to this is, that you cannot discountenance artistic thought from the conditions which help or hinder the execution of it. When these are changed, the product is changed, although the mind of the artist remains the same. No art critic, however penetrating, could infer the qualities which Turner put into his watercolor work from the very different qualities that he put into his etchings.

In water-color he carried refinement of tone and color to a degree of subtlety for which there had been no precedent, working out, with exquisite skill, the finest distinction between tints and shades; in etching he thought of nothing but the strongest and clearest expression by line, leaving delicate shades to be thrown over his work afterward by the engraver in mezzotint. That stultifying ignorant kind of art criticism which refuses technical knowledge, and will neither learn for itself nor be taught by those who know, is utterly useless when it meets with a case of this kind, and is sure to misunderstand, not only execution of the artist, but all that is most spiritual in his thought and work. In the example just given the reason why the artist gave one side of himself in etching and another side in water-color is a technical reason, yet it is a difficult mental expression. What determined Turner to etch always in line, and never to attempt delicate shade in etching, was the facility with which an etched line may be drawn, and the difficulty of getting accurate tones of light and shade by corrosion. Very likely he had tried to get full light and shade in etching, and found it too difficult and too hazardous. However this may be, it is certain that he perceived the difficulty, and, as he was a very large producer, who could not endure to be stopped or much retarded by technical impediments, he determined to use etching within fixed limits. We may observe, too, that in etching of light and shade was particularly exquisite, he would be less able than most artists to tolerate imperfections in his own work. But he clearly understood the value of line, and knew how much could be expressed by it, so that etching, by its technical conditions, induced him to use a simple linear expression, whereas water-color tempted him to an extraordinary delicacy of light and shade.

UNGER'S GIFT OF INTERPRETATION.

No engraver who ever lived has so completely identified himself with his painter as to have interpreted, as Professor Unger in the eighty-six plates which compose his *Œuvres*, and his work after Franz Hals. The faculty of throwing himself dramatically into the minds of different painters is so complete and powerful that this etcher identifies himself with one painter after another as an actor identifies himself with one character after another. We have been familiar enough with this power in actors, but very unfamiliar with it in engravers. The great old orthodox system of line-engraving was to apply set methods of execution to all painters indiscriminately, so that their qualities of touch and texture, however various, were all rendered in exactly the same way, and the engraver put his own style on the top of the painter's style, as we put an overcoat over our indoor dress, hiding it just as completely. Professor Unger's project was only possible with a tool which permitted the same manual freedom as the brush. Nobody was to be hurried into this perfect freedom, but the etching needle permits it. The needle is held as the brush is held, and the varied oblique does not impede its movements in any direction. It is not necessary that the needle should engrave lines in the plate; the acid does the work. All that the etcher has to do is to remove a very thin black ground or varnish wherever the needle passes, and this offers no appreciable resistance. Imagine, then, an engraver armed with a tool and provided with a process which allow just as much freedom as painting itself, and determined to use this freedom for the interpretation of painting with a degree of mental and spiritual sympathy like that which a good actor bestows upon the character he personates. Suppose, further, that the engraver possesses a skill in drawing such as is not attainable without the combination of labor and genius and a versatility which is perfectly unique—you have Professor Unger. He can adopt at will the most opposite styles, and work in each with an ease, a fluency such as other men can only attain in one manner—their own—and that after half a lifetime.

HIS METHOD OF WORK.

His way of work is this: Before beginning to etch he applies himself to the critical study of the painter to be interpreted, analyzing his execution, and entering into his feeling and spirit. After a critical deal of time spent in this critical gallery study, the hour comes when the etcher feels himself tuned in unison with the painter, and then he goes to work, being now in the assured possession of a special style for the special occasion. The reader will at once perceive that half the faculty here used is the critical faculty, and indeed it would not go far enough to describe Professor Unger as an artist, or of very uncommon insight, who explains the sentiment and execution of the painter, and the execution in the line of the pen. The mimetic talent is no doubt very strong in him; but this is not all. However striking may be his mimicry, he is still an interpreter, and more than a mimic—the wide difference between etching and painting compels him to interpret, and in fact his etchings are often very bold pieces of interpretation, fully preserving the spirit of the painter, yet sacrificing much to that.

It has been said of engraving that it is an unintellectual occupation because it is simply copying; but such engravings as this is not unintellectual, for it proves a certain amount of understanding which are rare both among artists and critics. Unger has not the narrowness of the ordinary artist, for he can enter into the most opposite style, nor has he the technical ignorance of the ordinary critic, for he can draw—I will not say like a great master, but like twenty different great masters.

UNGER'S ORIGINAL.

Franz Hals was the son of Master Pieter Claesz Hals, Alderman of Haarlem, Pieter Hals removed temporarily, with his wife Leydse, to Antwerp, where his son Frans was probably born at Antwerp about 1584; there was another son named

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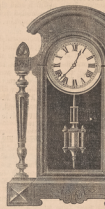
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Dirk, and there were also two girls who died young. Frans was early at Haarlem in the studio of Karel Van Mander, probably from 1600 to 1603, when Van Mander quitted Haarlem. He learned little from this master except dexterity in handling a brush. He was a stranger to all academic lore, to all literary procession, and appeared first merely as a portrait painter. He was living at Haarlem as a master painter at the beginning of 1611, and there married Antjeke Hermans. His artistic career may be divided into three periods. First, he was a portrait painter, as we have just said, then he found subjects for what are now called genre pictures in the joyous popular life around him, and lastly he painted memorial pictures, including many figures, such as those of the arque-busters and the civic governors.

No traces of work by Hals are found before 1614. He painted hundreds of portraits representing everybody who was remarkable in Haarlem—Catholic ministers, Roman Catholic priests, literati, men and artists, old women and blooming damsels, ensigns and colonels, knaves and fools, gamblers and tipplers, Kates and pretty Alices. In 1616 Hals first painted for the Civic Guard. He painted the same subject often afterward, and other pictures of officers and public bodies in groups. If Hals could have done his work at the present prices he would have made an immense fortune, but even in the last century they were worth very little, only a few florins and there is difficulty even now for the most patient, in waiting 200 years, especially when you have seven sons and four daughters, as Frans Hals had. He seems to have kept out of serious difficulty until 1634, which is much, under the circumstances; but in that year he has to pledge his mattresses and pillows, besides a cupboard and table and five pictures. In 1661, on account of his age, he was exempted from paying six stivers to the guild. A year after, at his request, the burgomasters grant him an income at once, and provisionally 150 florins a year. In 1664, on petition, three wagon-loads of pent are sent to him, besides an annuity of 100 Carolus guilders. In the same year, says Mr. Vosmeer, "he completed those bold paintings, those governors and governesses, and we do not wonder that their tone is so gloomy and their handling so wild, and betrays the violent strife between genius and fate." He died at the end of August, 1666, and was buried in the choir of Haarlem Cathedral. In 1675 his widow received 14 stivers, a week from the poor's box. Hals was born twenty years, and died three years, before Rembrandt. Like Rembrandt he attained to a conception of art which, in technical matters, was too high for the general public of his time. What was really in fashion at that time was what the vulgar in every age considers to be high life. The fashion led the popular artists, as Samuel Van Hoogstraten said, "to paint one another blind with trifling." "Broad-brimmed and firmly fixed feathers were as little to the taste," says Mr. Vosmeer, "as those of Rembrandt, and the high technical execution in both of them was general admiration by a late posterity." It is very well known among painters that there is a great advantage in leaving touches undisturbed as they are, only if only they are in the right place and of the right color. A picture so painted has always more vivacity and truthfulness than one in which the tints have been muddled by hesitating corrections. This is the technical charm of Hals. He had the decision of the great masters and a sustained vivacity. It is unnecessary in this place to say much about his color, but one peculiarity in it may be noted, the immense importance which he gave to black. Even in the pictures of his early manhood and middle life, black is of great consequence, but in those of his age it is everything. This brings us back to the point from which we started, the ever-recurring technical considerations, of which we can now speak with safety, less sight, either in the practice of the fine arts or in criticism. Nobody could interpret Frans Hals, who did not bring to the task the power of rendering the viva-

city of his execution, and also the power of imitating his blacks. Etching affords the means of doing both, which is more than can be said of any other kind of engraving.

UNGER'S PERSONAL STYLE.

I have spoken of freshness and vivacity as characteristics of Unger's talent, and that they are really so is proved by the admirably clever portrait of himself on the title-page of the "Ouvrage" and by the portrait of Franz Hals on the title-page of the etchings after Hals. Nothing is more desirable in such a case as this than to know what the artist's own personal taste and his own style are, and noting in this instance would be more difficult if a scrap or two of original work had not been there to reveal it. The personal style of Unger is a charming example of easy handling combined with keen observation; it is what may be called a good-humored style; it is absolutely free from pedantry, yet full of cunning and knowledge. I can so rarely remember the work of any master which contains so much at the cost of so little apparent labor. These two portraits speak as if they were done in an hour for each of them; they may really have been drawn on the copper in three hours or less, though the fitting must have taken longer; and so perfect is the work that the artist seems to have done them as one would whistle a familiar tune. If, however, any competent judge of drawing will take the trouble to examine them seriously, he will soon discover that they are full of consummate finish; I mean that they contain a great variety of truths, which are blended together with perfect harmony of style. The modelling is as firm as in a picture, so that the heads are not mere outlines, but have solidity of bone and muscle; the light and shade is so thorough and savant that even faint reflections are given with their faintness, and stronger ones with their just degrees of illumination; the local color is so to color that you have the accurate weights of color in two different complexions, with different coloring of hair and beard. All these qualities, which are striking in expression, are given simultaneously. This, then, is the personal style of Unger, a very synthetic style, full of various truths in harmonious combination expressed with a facile liveliness. Let it not be supposed, however, that the artist is in the least impeded even by the merits of his own manner in the interpretation of other men's work. His vivacity is allowed free play wherever it is necessary or useful, as for instance, in the interpretation of Franz Hals; but where it is not necessary the etcher lays it aside like a mask, and becomes grave, extinguishing all his points of brilliancy, as a woman takes off her jewels, or as the lights are put out after a festival.

TIME IN ART.

"Le temps ne fait rien"—either on one side or the other, as a claim to critical indulgence. "This plate took me six months," or "this plate took me only hours," are alike impertinences from the high artistic point of view. Some of Unger's etchings have been executed, apparently at least, with great rapidity, and others with the most painstaking deliberation, the result being equally valuable in both cases. As an example of wise economy of work, that on that which is rapidly executed, after Paul Potter, a piece of first-rate work in the kind of etching which is done with few lines; and on the other extremity of the scale, let me select the two etchings of guitar-players after Terburg and Metz, and "La Femme au Pot de Bière," after Metz, and "Succes at Jalousie," after Van der Meer, all elaborate pieces of work which must have required infinite patience. These extremes of execution not only prove the versatility of the artist, but also the singular adaptability to very different purposes, of the art which he has so wisely chosen. Let me only add that a higher value may be set, relatively, on the rather strongly expressed work than on that which is so patiently finished, because it better exhibits those qualities in which the art of etching is without a rival. Thus I should say that in interpreting Frans Hals in his

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Silver and Gold Solution.

(CONTINUED.)

Solutions for the electro-deposition of silver may also be prepared by the use of the battery. This is the shortest method, and by some it is considered the best; still, as doctors disagree, we will only say that we prefer solutions made by the acid method, though it may be from want of experience with the second we are led to choose the first. To prepare the bath by the battery we first made a solution of cyanide of potassium the size we desire, and the strength to be about 14 ounces cyanide to the gallon. Into this solution or cyanide we put a porous cell, filling the cell with the same solution, taking care that the liquor is the same height inside and outside the porous cell; then in this porous cell we hang a piece of metallic copper, iron, or any good conductor of electricity, taking care to connect this metal with the zinc pole of the battery. Now, outside the porous cell, in the cyanide solution, we hang our silver anode, which should be rather large in extent of surface. This silver should be connected with the copper pole of the battery. It is found often better to have more than one cell to the battery, in which case the zinc of one cell must be joined to the copper of the next, and so on.

This solution is now left to the action of the electrical current for some hours, or till the required amount of silver passes into it, after which it is ready for use. We should explain here the action of the porous cell, which is to prevent the silver from depositing upon the metal within it, while at the same time it allows the passage of the electrical current, and as by then precipitate with hydro-sulphate of ammonia. This will form a heavy black precipitate, which must be allowed to settle, and also must be carefully washed.

Make a solution of cyanide one-half ounce, and with it dissolve the precipitated gold; then evaporate to dryness. Dissolve the residue in one quart water.

Still another method is to dissolve our gold in "aqua regia" and evaporate to dryness; then redissolve in one half-pint distilled water, after which the gold may be precipitated by the use of ammonia, while proper care must be exercised not to add the ammonia in excess. We then pour off the residue as before, and carefully wash the top layer as before described. Add cyanide of potassium until the precipitated gold is dissolved; then evaporate to dryness, after which redissolve in half-pint distilled water. This solution should then be filtered, adding distilled to make up to one quart. It will be found necessary to add cyanide to this solution occasionally to keep it in working condition. The method of making gold solution by the battery is the same as given for silver, using one ounce of cyanide of potassium, one quart of water, and filling a "porous cell" to within about one or two inches of the top, with the liquor, placing this cell in the cyanide solution, hanging a sheet of copper plate in it, and connect this with the zinc of a "zinc battery," then put your gold plate in the outside solution, connecting this with the platinum pole of the battery, and allow the electricity to pass till we have the amount of gold in solution, which is told by weighing the gold before and after immersion. Take out the porous cell and throw away the contents.

These solutions are best worked at about 120° F. The dishes for holding and heating gold may be made of iron or glass, though the iron is sometimes used without enameeling, and forms one anode; but solutions worked in that way are a constant source of trouble, as the gold is being deposited from the solution, causing it to weaken and rendering it necessary to make frequent additions of gold. The expense upon material, and the danger, as it is termed, of depositing gold from hot solutions, is much better than the deposit from cold baths, as the gold resists the deposit and neither the color is deeper, and articles thus gilded do not require to be colored up. This would cor-

colored solution, which we allow to settle for a little while, as there may be a small portion of chloride of silver present that we wish to settle, in order to separate it from the gold, as the retaining of it would be prejudicial to the working of the bath. The top liquor must be carefully decanted from the sediment, taking care that none of the sediment follows it. Next, add to this top liquor a strong solution of cyanide of potassium, adding gradually and stirring the solution with a glass rod.

The yellow precipitate will disappear, and a brown precipitate will be formed by the cyanide, and this cyanide must be added drop by drop till it produces no effect upon the clear liquor. Here we must be careful not to use too much cyanide as it would redissolve the gold.

After we have precipitated all the gold it should be allowed to settle for some time until the top liquor is clear. This top liquor should now be drawn off from the precipitated gold, which gold we must be very careful not to waste in the washings to be given to remove by solution the other metals possibly present.

When the washing is completed we add more cyanide solution to redissolve the gold, and this will result in a clear solution; and to this should be added cyanide solution to the amount required in dissolving the gold. The concentrated solution of cyanide of gold we have obtained is put over a fire in a sand bath, and evaporated to dryness it may then be dissolved in cold water and filtered, after which we add boiling distilled water to make one quart of solution. If we find that this solution works slowly it is necessary to add more cyanide; but this should be done continuously in order that the residue shall not be in excess too largely. Another method is to dissolve the gold as before, evaporate to dryness, and redissolve in a half pint of distilled water, then precipitate with hydro-sulphate of ammonia. This will form a heavy black precipitate, which must be allowed to settle, and also must be carefully washed.

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rect the mistaken idea that cold deposits of gold resist more than hot deposits. We affirm on the contrary, that the same quantity of gold deposited from a hot bath will resist much more wear than the same quantity deposited cold. It is well known that all electro-deposits are nothing but colloids, the meshes of which are more or less close. It seems evident; therefore, that when deposited cold it will remain where it was when deposited; but in the other case, if we plunge a cold article into a hot bath the surface expands, exposing a larger surface for the deposit, and, upon cooling the meshes of the deposit, are brought nearer together or made more compact.

A Famous Jewel.

The following description of a magnificent diamond, owned by Col. Wood, of Philadelphia, appeared in a recent issue of *The Daily Graphic*:

It is well known that almost all of the finest gems are owned and held in Europe, and the great concentration of wealth in the old capitals of that country has heretofore made London and Paris the great market for precious stones; but the rapid increase of wealth and taste in art matters in our own country has created such a great demand that America bids fair soon to become the best customer for these highest representatives of concentrated wealth. Indeed, so critical have become the leading retail dealers of the United States and so high is their standard of quality and excellence that it is almost impossible to satisfy them, and Messrs. Smith & Hedges, (1 Maiden Lane) who are probably the largest importers in this country, are now compelled to keep one of their firm permanently in Europe to be at all able to supply the demand for fine gems.

The Old World, however, does not possess all of the large diamonds. Col. J. H. Wood, of Philadelphia, is the fortunate owner of a gem of splendid proportions and dazzling beauty. Col. Wood is the well-known museum proprietor of Philadelphia and Chicago, and has for many years been noted as the possessor of the largest diamonds in the United States. Our illustration gives some idea of the size of this great diamond, whose history, unlike that of many others of its size, tells not of wars, rapine, and massacre.

shall follow the diamond immediately and arrange for its sale. I am yours, very respectfully,

W. A. F. FAYERS.

The stone arrived in this country in the autumn of 1873, and was placed on exhibition at Wood's Museum, Philadelphia, where it was naturally a centre of attraction, its gemmiferous having been guaranteed by Prof. Lerdy, of the Academy of Natural Sciences at Philadelphia. It was finally decided to cut and polish the stone, and after serious consultation and correspondence with the famous cutters of Holland, it was thought best to intrust its cutting to Mr. Isaac Hermann, of East 15th street, N. Y., who, after months of anxious labor, at last completed the great work and delivered to the owner a perfect gem—the largest diamond ever seen in America, and than which but few larger in the world. It is very brilliant, and in the rough weighed eighty carats; it has sixty-four facets, and is worth in the neighborhood of \$50,000.

He Wanted Tick as Well as a Ticker.

He said he wanted to deal directly with the proprietor of the jewelry store, as times were hard and must have lard-pan prices. He looked at a silver tea-set, at a gold-headed cane, at a set of jewelry, and finally at a gold watch. Then he said:

"I did think of making my wife a Christmas present, but she's always growling around and finding fault, and so I'll let her slide."

"Won't you take the cane for your son, as you proposed?" asked the jeweler.

"No, I guess not. Jim loafs around a good deal, and only the other night he told me to shut up and go to blazes. If he wants anything in his stocking let him behave himself."

"Well, about the watch?"

"I guess I'll buy the watch and make myself a present. I never had much of anything in my stocking, and I feel that I hadn't been used right. What's your lowest figure?"

"Two hundred dollars."

"Can't do it. You must remember that these are hard times."

"Well, say \$100."

"Can't do it. Times are awful."

"I'll make you this watch for \$180, and not one cent less," said the dealer.

"All right, I'll take it, though it looks like a big price."

The jeweler placed the watch in the box, stuffed cotton around it, and as he held it on the show case the stranger said:

"You kin charge it."

"Charge it? I don't know you?" exclaimed the dealer.

"You don't?"

"No, sir."

"Don't know a man who has lived within twenty-eight miles of Detroit for thirty-seven years?"

"No, sir."

"Never heard of me in your life?"

"No, sir."

"Well, I won't take the old watch," said the old man, as he backed off. "You don't seem to have much git-up-and-go-ahead about you, and I always make it a rule to patronize live firms. You'd better subscribe to some newspaper, and git to know what's going on."

"You are no gentleman, sir!" said the irritated dealer, who had lost a full hour's time.

"Can't help it. Won't patronize no such low man—no use talking!" replied the stranger, waving his hand. And he passed out to visit some other firm who did know a man who had lived within twenty-eight miles of Detroit for thirty-seven years.—*Detroit Free Press.*

Very large fans are no longer fashionable; they are still painted in delicate colors, and some of these paintings are exquisitely beautiful, and make the fan a real work of art. Curled maroon, feathers edge them. Black and white fans prevail, almost to the exclusion of colored ones. Black silk fans, with a large, bold cluster of flowers painted on one side, are exceedingly handsome, and suitable for almost any costume of a dressy kind.

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The following letter shows how Colonel Wood first came into possession of it:

PORT NATAL, Africa, April 22, 1872.

Colonel J. H. Wood.

DEAR SIR AND FRIENDS—You know already by telegram of the finding of the big diamond, and its shipment to you by the brig Alvan as far as London, thence to New York by steamer. I had from the start the very hardest kind of back-to-no money to buy a claim, and too sick to be of any value to those who had chains and wanted white abusers. The stone stores I had were about exhausted, and starvation stared me in the face. Being unable to work, I spent most of my time, when able, in fishing and hunting, trading freely for my game among the miners. On the 13th of April, a heavy rain having been falling for six weeks, I started out to fish in a small stream flowing in the Limpopo river, and at about four o'clock in the morning, just day light, while digging for bait I turned over a large piece of clay, and there, sticking fast to it, was this wonderful and mighty diamond. I immediately left the previous stone, and worked on till my feeble strength was exhausted, but found no more. I turned among the miners, to whom I dared exhibit it, said it would weigh from 100 to 125 carats. It weighed nearly one half ounce, but I was not paid to point. I sent it to you so that it can be seen by you, and the public. I was offered \$20,000 for it by a speculator. I have had it insured for \$75,000 and sent the policies to you. I

Indian Mode of Casting Delicate Objects in Metal.

Many of the ornaments brought from India are cast in a delicate and refined manner. Those curious to know how they are made will gain some information from the following extract:

The goldsmiths and silver workers always prefer the curious clay compound prepared by the white ants, and taken out of their huge honeycomb chokes, for forming the tiny crucibles used in their arts; it burns beautifully without cracking, when taken from a proper locality, but it is more frequently found as here—in Jubbalpore—full of air and troublesome after repeated washings, to hold together. The stomachs of these "white ants" are evidently supplied with a powerful chemical secretion, and this double containing with certain clays and earths, constitutes the useful ericable product I now speak of. It burns to a hard white vessel, on which the borax of the artisan gives a brilliant internal glaze, but I have never seen this earth used for any but the diminutive melting pots allied to. White ants, they "swarm" or "hedge" for a short time on sheet glass, corrode the same in zigzag patterns, as if etched by fluorine acid; occasionally these marks resemble Persian characters, or Egyptian hieroglyphs. Hence some potent chemical seed enters into their building composition, of which the tenacity in some countries, when it has been well kneaded, powdered, and sun-dried, renders it a fine cheap filler for settler's houses. It is very generally used in South Africa, where I employed it for the upper portion of a rough stone floor to my verandah.

But I must return to my artistic Indians and their primitive "dodges." In casting small articles in brass and cheaper metals, they fix the mould with iron wire to the melting pot, well luting the connections repeatedly with a mixture of stiff clay and cow dung kneaded together till quite strong and safe, gradually warming the luting at the mouth of the furnace, and repairing all cracks and fissures as they may appear; when thoroughly dry, the whole mass is put in the rude native furnace of common clay, and on the contents of the melting pot being fused, it is turned gently "topsy-turvy," and the metal runs from the inverted mouth into the attached mould. For articles of ornament and elaborate design, of any size, even to fine piece, the native workman makes a composition of two parts "dammar" resin, and one part beeswax (common resin will replace the first in England); these are very slowly and carefully melted over charcoal, and stirred together (in the open air, and not under a roof), and when almost hard are moulded by the hands, the lathe, or in metallic "gages." These moulds in their turn are then encased in suitable mould clay, and very carefully and slowly dried in a shady spot until perfectly hard and seasoned. The workman then over charcoal, gently heats the mould and pours out the composition from the hole he left as a future "ingate;" when every particle of the mixture has flowed out into a vessel held to catch it for future use, he increases his fire till smoke rises from the interior of his mould, and it is gradually brought to a condition to receive the molten metal. From an earthing to an idol this is the favorite *modus operandi* of casting, and I can most thoroughly recommend it to the ingenious amateur, if he be not already practising it. Bismuth is so very highly prized in India that I never employ "fusible metal;" the present mode, besides being cheaper, gives a shape more immaculate, in substantial clay coverings, which, when red hot, were filled with molten gold or silver, and gave the perfect images required by the priesthood. The delicate German cast of flowers and insects are nowadays cast in the same fashion—

"burning out." Fish and reptiles, such as snakes and lizards, may be so cast very life-like in tin, and afterwards bronzed. I lately amused myself by getting the perfect nature model of a water snake about two feet long, in the above manner. I got a split bamboo equally divided; I placed good fire clay in each half of this bamboo; I then put the snake carefully between the two pieces, secured the halves of bamboo firmly by binding wire at intervals of a few inches; I dried the perfect nature model of a fish slowly in a long charcoal stove of clay gradually burnt out the snake, and poured in pewter's solder—that is 2 parts tin, 1 part lead.

Magnetism.

We clip from the *Scientific American* the following correspondence on the subject of Magnetism, which will, no doubt, interest our readers:

A few weeks ago my watch, for the first time in ten years, refused to go. Up to then it had kept correct time, and was then in good repair, having been recently cleaned. When it first began to stop I would start it by the key, and it would sometimes run a day; but finally it stopped entirely. I had it carefully examined by an expert, who, although he could find no cause, failed to make it run even for an hour.

I am running at my works a powerful magneto-electric machine for depositing copper; and having noticed that I could magnetize a piece of soft iron at a distance of at least six feet from the machine, so that it would lift and support the weight of a large nail, I became impressed with the idea that some of the steel parts of my watch had become permanently magnetized; so I made a watch repairer take it apart. Having some fine soft iron filings, I dipped the balance wheel, escapement wheel, lever, and hair spring into the filings, and each piece raised up at least one-half its own weight of the filings, showing all the polar characteristics of the particles.

I have never seen a watch being spoiled by magnets, but had no idea that it was unsafe to go into a room containing a magnet.

The watchmaker thought he might "brush it off" for about a dollar; I let him brush on it three days as a lesson in magnetism, and then told him that nothing short of heating it red hot would demagnetize it. He put in new parts, including a new mainspring, which was also infected, and the watch now runs as well as ever.

I. B. FULLER.

Demagnetization of Watches.

Watches worn by students and others in technical laboratories are often rendered useless by being magnetized by the magnets used in such rooms. Magnets kept in the house often create equal mischief by being laid near watches, and much time and expense are sometimes needed to demagnetize them before they can be made to work. A serious case of this kind of injury recently led Prof. A. M. Mayer, of the Stevens Institute of Technology, to try a new method, which resulted in a very simple method of demagnetization. The magnetized watch was laid upon a table in the neighborhood of a common compass needle. Each turn on the face was then placed in turn before it to discover the location and intensity of the magnetism in the watch. The compass needle was then moved to the north and south poles to be located (say) at the figures V and XI, while the neutral points were at VIII and II. The watch was then held in a horizontal position before a large bar magnet, the south poles of each being together. A magnetic tilting motion was given to it for a moment, and, on trying the watch again before the compass, a sensible decrease of magnetism was observed. The process was repeated till the sensitiveness of the watch at that pole was nearly extinguished, when the same thing was tried with the north pole of the watch. After a few trials and comparisons, the magnetic influence was found to be removed, and the watch readily resumed its work.—*Scientist's Monthly*.

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MORGAN & HEADLY,

Manufacturing Jewelers,

No. 613 SANSOM STREET,

PHILADELPHIA.

Vest, Opera, and Guard Chains, Stone Cameo, Coral, Amethyst and Gold Sets, Enamelled and Roman Bands, Roman Lockets, Stone Lockets, Studs and Buttons, Stone and Plain Gold Rings, Gold Spectacles, Eye-Glasses, &c.

F. H. MATHEZ,

Manufacturer and Importer of

WATCHES & MOVEMENTS

OF STANDARD REPUTATION AND QUALITY.

Desires to inform the Trade that he has recently made arrangements for the production of a full line of French and Ladies' STEM-WINDING and STEM-SETTING WATCHES and MOVEMENTS—All $\frac{1}{2}$ size.

These Movements are uniform in size and interchangeable in parts. It requires therefore but a small assortment of Cases to keep a full stock, and parts of all kinds will always be kept on hand to supply the demand.

250 Samples, for examination, will be sent on application, accompanied by satisfactory references.

No. 5 Maiden Lane, New York.

Old English Plate.

There is a story that some little time prior to the commencement of the War of Independence, the question was raised at a polite dinner party in England: Which of the North American provinces were really sufficiently wealthy to bear taxation? An army officer present, who had been in the country, observed that if an abundance of handsome plate was to be accepted as an evidence of wealth, there was an abundance of money in America; and it is added that the company present agreed from this remark the notion that a large luxurious class existed here.

There is no doubt a considerable amount of fine old plate in the United States, acquired either by bequest or purchase, and some of its possessors may be glad of the following particulars as to the marks which distinguish old English silver and gold, which an English correspondent sends us:

MARKS ON SILVER.

The silver marks are various: 1, the maker's mark; 2, the hall mark (Goldsmith's Hall mark); 3, the duty mark; 4, the date mark; and 5, the standard mark.

The first shows the maker, the second the place at which the piece was stamped, the third the reign to which it belongs, the fourth the year, and the fifth the quality.

More specifically, silver bears five marks: 1. The maker's mark, consisting of the initials of the maker's Christian and surnames; 2. Date mark, a letter of the alphabet, the character of which indicates the year; 3. Duty mark, which is the head of the reigning sovereign, in profile; 4. The hall mark, which is a leopard's head, crown, for London; five lions on a cross for York; a castle with three towers for Exeter; three castles for Newcastle; an anchor for Birmingham; a crown for Sheffield, and a sword between the points of a cross for Chester; 5. The standard mark, which is a lion passant for silver of sterling quality, or which contains 11 ounces 2 pennyweights of silver in the 12 ounces.

MARKS OF THE GOLDSMITH'S COMPANY.

The marks of the Goldsmith's Company are as follows:—1656 to 1675, old English capitals; 1676 to 1695, small Roman letters; 1696 to 1715, the Coat alphabet; 1716 to 1735, Roman Capitals; 1736 to 1755, small Roman letters; 1756 to 1775, old English capitals; 1776 to 1795, small Roman letters; 1796 to 1815, Roman capitals; 1816 to 1835, small Roman letters; 1836 to 1865, old English capitals; 1866 to 1875, old English small letters.

There is no great difficulty in seeing what sovereign's head is upon the plate, and, to learn the date, this of course must be observed as well as the date mark.

The goldsmiths in England were incorporated so far back as the reign of Richard II., but there is no doubt proof that the English jewellers and workmen had obtained great excellence long prior to that period.

In the time of Henry II., a certain monk had acquired so great a reputation for his works in gold, silver, gilding and jewelling, that he was invited by the King of Denmark to embellish his crown with gold, and be his banker or money changer.

The business of banking came gradually to be superadded to that of a dealer in the precious metals, and led to the latter being relinquished in favor of the former.

Thus, to give a notable example, Sir Francis Child served his apprenticeship to William Wheeler, goldsmith and banker, and marrying his only daughter, succeeded to his estate and business, from which originated a celebrated banking firm—the first now in London—Child & Co., of Temple Bar. Sir Francis was born in 1642. The Earl of Jersey is the principal partner in the banking house, as representative of his family. This lady, long known as a celebrated leader of fashion in London, succeeded to this inheritance, with a great amount of other property, under the will of her grandfather, Mr. Child. Lady Jersey's mother had eloped with Lord Westmoreland, and Mr. Child was so incensed that he determined to prevent the marriage, and so, benefiting by his wealth. He bequeathed the whole of his property to his granddaughter—Lady Westmoreland's eldest

daughter, who became the wife of Lord Jersey. The elopers were hotly pursued by Mr. Child's direction, and nearly overtaken, when Lord Westmoreland, leaning out of a window, pistol in hand, shot one of the leading rascals attached to the pursuer's carriage. It is remarkable that Lady Jersey's own daughter was the last person of consequence married at Gretna Green, having eloped in 1843 with a young officer of the name of Ibbotson. This affair made almost as much noise at the time in the fashionable world as the elopement of her grandfather 60 years before with the heiress of the millionaire banker. The accumulation of plate in the old families in England was only realized in 1862, when an exhibition of art treasures was held in the building of the South Kensington Museum, to which nearly every great family sent liberal contributions. The Earls of Stamford and Warrington were for a long time under the necessity, in order to comply with the terms of an ancestor's will, of buying a certain amount of plate every year, and nearly everything in their house for which silver was at all suitable was made of that metal. The Duke of Buccleugh has a famous collection. He inherits through his mother, the Countess, the daughters and co-heiresses of one of the great Dukes of Marlborough, some of the splendid silver ware of that rapacious warrior, and his best, great-grandson, from various other sources. The Marquis of Exeter, the direct line descendant of the great Lord Treasurer Burgley, is also very rich in the same way; his famous "Burgley House" by Stamford Town" being filled with valuable articles, many dating from the Lord Treasurer's time, and from a grand old man, Henry Kent, formerly the residence of the Duke of Dorset, is a room in which almost every article is of silver or massively decorated with silver. It was furnished by the then Lord Treasurer—who, it may be fairly inferred, made a good thing out of his post—for James I.'s occasion on a visit.

THE PLATE MOST IN ESTEEM IN England is that of the time of Queen Ann, for which the most extravagant prices are frequently given by amateurs. The universities are rich in silver; but in many of the Oxford colleges they have none earlier than the time of Charles II., having given what they had before to Charles to help him in "the revolution." It is the custom for families, when leaving London or England, to send their plate chests to their bankers; and some London firms have immense amounts in their cellars, which have been lying there for years and years. In one case a very celebrated firm some time since proceeded to examine unclaimed chests of plate which had been an extraordinary length of time in its possession, and had, it seemed, been entirely overlooked and forgotten, and the contents were distributed amongst those persons who, after careful inquiry, appeared to have a just claim to them. The turf has given great encouragement to the manufacture of ornamental plate of the costliest description, and the best artists are employed by the leading silversmiths in order to bring this branch of their trade to the highest perfection. The greatest fortune probably ever made by a jeweler was made by Mr. Randall, of the celebrated firm of Randall & Bridge, who left considerably over a million of money. It is said, and no doubt with truth, that a great deal of Mr. Randall's money was made by buying splendid jewels at an immense advantage from French emigres after 1870.

Messrs. Rest Penner Smith & Co., the well-known manufacturers and importers of walking canes, are among the largest dealers in the above line of goods in this city. They have constantly on hand a large and varied assortment of canes for all classes of trade, and a special line to the requirements of the jewelry and ribbon trades. Particular care is taken of such goods would do well to call at the establishment of R. F. S. & Co., No. 543 Broadway, N. Y.

MILLER BRO'S

MANUFACTURING JEWELERS,

11 MAIDEN LANE, New York.

INITIAL GOODS A SPECIALTY!



Manufacture, 47, 49 & 51 Franklin Street, New York, N. Y. ISAAC M. MILLER.

Sets, Sleeve Buttons, Studs, Collar and Cuff Buttons, Enameled, Pate, Engraved and Roman Gold.

Mounted in Pearl, Stones, Coral, Onyx, Amethyst, Topaz, Garnet, No. No.

L. A. LUTZ, Successor to

LUTZ BROTHERS,

Manufacturer and Importer of

WATCHES

OF EVERY DESCRIPTION.

Factories in LOCLE and GENEVA, Switzerland.

Fine Movements a SPECIALTY. 2 sec.-mils. Chronographs and Extra Fine Silver Watches always in Stock. Goods sent on approval, satisfactory N. Y. City references being furnished.

Represented in New York by EMILE J. DERAISMES,
71 NASSAU STREET, Cor. John,
P. O. 20339. NEW YORK.

NICOD & HOWARD,
Importers and Manufacturers of WATCHES,
SOLE AGENTS FOR THE
TRADE MARK.

Nicod & Howard

No. 36

14 John Street, New York.

P. O. Box 2209.

H. HOWARD.

ARNOLD NICOD,
Factory, 12 Rue St. Pierre Chaux de Fonds, Suisse.
ESTABLISHED 1847.

The American Sterling Company



SAUBO, CONN., NEAR HARTFORD.

Manufacturers of Silver-Plated Spoons, Forks,
AND A GENERAL LINE OF FLAT WARE.

The base used is AMERICAN STERLING METAL, of our own manufacture, which contains 20 per cent. of nickel, and being made by a process which renders it harder and tougher than ordinary 18 per cent. nickel silver, it is the best base now in use for plating. Our goods are plated with full weight of silver, and carefully weighed before and after plating, and the amount of silver guaranteed as represented, and the goods warranted in every respect.

Office, Nos. 1 & 3 DEY STREET, N. Y.

gracious, built a fine factory, constructed the most elaborate and costly machinery, patented every so-called improvement and invention the watchmakers brought to him, introduced every watchmaker's capricious notions, and at the end of two years had his *perfect watch* just complete, when some other person suggested a slight alteration in the construction of the escapement. These experiments necessitated large expenditures. At this state of affairs Lucie began to betray some uneasiness. Inventions of self-compensating balances, isochronous hair-springs, self-adjusting regulators, and other wonderful improvements that were going to revolutionize watchmaking were each in turn patented and experimented upon, until it drove everybody connected with the establishment nearly crazy.

The third term was drawing to a close and Lucie was congratulating himself on the certainty of securing his victim when in an unfortunate hour some fellow inventor of a watch with only three wheels which would keep perfect time and could be sold for \$10. This new movement was at once seized upon, and the whole machinery of the law brought to bear to secure it from infringement. Arrangements were made for branch factories in all the States of the Union and in most of the European capitals, and regulations were entered into with Mr. Stanley to open up to the African market.

When Lucie saw how things were going, he felt sad. He heart failed him. He consulted with his friends. The model watch factory had absorbed millions and there was nothing to show for it. He saw inevitable ruin before him if he persisted in fulfilling the terms of the compact. So he went with tears in his eyes to his would-be victim and begged to be released.

Our friend played the "a little, but no more" was only too glad to give it. It is said he is the only man who ever made a good thing out of starting a watch company.

Editorial Jottings.

We are pained to record the death of Barabaz H. Hyde, of pneumonia, on the 23d ult. The deceased was an employee in the house of Tiffany & Co., and leaves a wife and family and a large circle of friends to mourn his loss.

We learn that Messrs. S. & J. Myers, of Boston, have submitted a proposition to the Secretary of the Treasury for an authoritative stamp or "hall mark" for jewelry. The Secretary has promised to present it to Congress for consideration at an early date, until which time we are not authorized to give particulars. There is a strong feeling in the trade that some such method of endorsement is desirable, and the question is of deciding one which shall avoid the objections urged against those so far in practice or suggested.

About this time look out for rumors! and don't believe them unless you have reason to. Somebody started, the other day, the absurd rumor that Tiffany & Co. had failed, and started the newspaper reporters up to interview the firm. Mr. Andrews, the junior partner, gave a *quiescent* reply by stating that "the firm did not owe a dollar to anybody in Europe or America," and they had made up their minds not to take notice of the reports current, printed or oral. Mr. Cook, it may be added, has sailed for Europe on his purchasing trip. Another rumor was afloat that the Dorbank Manufacturing Co. had suspended, with all its prospective future. Both these rumors were probably never stronger than at the present time.

It is with exceeding regret that we announce the failure of Mr. T. B. Byner, of No. 527 Broadway, who has assigned his stock for the benefit of his creditors to Mr. Appleton, of Robins & Appleton. Mr. Byner has been known to all the trade for years as an honest, honorable, and in every way respected business man, and therefore will only sympathy for him in his misfortune. The failure

seems to have been caused by a mistaken diversion of his business, on his removal up town, into other channels than those in which it had before chiefly run. It is not one of those which have disgraced the trade during the past year, but the farthest removed from them, and we are sure that the creditors of Mr. Byner will be quick to recognize this fact, and to mark it by the different treatment of a bankrupt whose entire probity no one doubts, and whose misfortune all heartily regret.

Trade Cossip.

—A "High Time" The Tribune Tower clock.
—Philadelphia jewelers are reported to have done a splendid holiday trade.
—Epianets of vulcanized India-rubber have been introduced into the French army.
—A new pocket compass invented in England has the novelty of pointing to the true and not to the magnetic north.
—Store girls all over the country are taking a firm stand on the all-down question. They have the sympathy of the general public.
—Hunting & East have been compelled to make some concessions in the price of their watches. Their liabilities are said to be very heavy.
—A fire at the American Jewelers' Works, Providence, on the morning of December 23, caused a loss of \$1,300. Insurance reported to have expired.

—Waters & Cohen, of Montreal, have failed. Their liabilities are said to be \$38,812—assets \$2,600. They owe nearly one million dollars.

—Kleinberger, Jeweler, No. 739 Fulton street, Brooklyn, has received orders for the last inst. at \$2,750 worth of diamonds, watches, and jewelry.

—The American Watch Company are producing ornamental watch cases that are marvelously beautiful. Some of their recent designs are perfect works of art.

—The jewelry store of Beuchet Bros. was robbed in a very mysterious manner of about \$4,000 worth of jewelry on the evening of the 20th ult.

—James C. V. Chase is the name of a subscriber to this journal. What the use of making the alphabet in this way when nobody prevents him from taking the whole of it.

At a party on Fifth avenue, last evening, the hosts used to be a chandelier in a Boston hotel, but married to a New Yorker.

—Necklaces are in great variety, but the latest and handsomest is a hard one-half of an inch in width, formed from a ring of pure gold and studded in the middle at intervals of an inch with faceted red balls.

A law should be passed requiring pawnbrokers to render to the Superintendent of Police every morning detailed inventories in writing of the articles received by them as pledges in the course of the preceding 24 hours.

An antique ring, bearing the inscription "Elizabetha," has been found by a laborer in a ditch near the city of London, and is supposed to have belonged to the wife of Alfred the Great. The ring has been purchased by Colonel Greville of Durham.

—An Englishman compares a man to a clock, and a woman to a watch, and says: "You can stop a clock at any moment, but you cannot stop a watch. So it is with the talk of men and of women. Man is a great, ugly, coarse, unchangeable, but you can stop him. Woman is a beautiful, fragile, lowly thing—but she will run on till the stops of heaven are jarred."

—Dr. Peterson, the great German geographer, has been named by the Emperor of Russia as Zambale, Africa, are identical with the Opbit of the Bible from which King Solomon is said to have conveyed the precious stones for the construction of the temple. The plan now proposed is to excavate and explore the buildings of unquestionably remote antiquity.

—The South of India *Glossary* says that the Jew worn by the late Gulkar of Baroda at the landing of the Prince of Wales are estimated at two millions sterling. The principal features were a plume of diamonds in his turban, and a large band of pearls fringed with gold. He also wore the enormous State of India, and a chain of which nearly broke the Baroda exchequer.

—The late Gulkar of Baroda was supposed to have had the most magnificent coat ever made in India, valued at six lakhs of rupees, or \$275,000. It was sent on an offering to the shrine of the Prophet at Mecca. But this coat is about to be shipped by way lately made for the Sultan of Persia, which, a correspondent of the Delhi *Glossary* tells us, is "valued at Indian lakhs 673,000, set with precious stones, and fringed about the collar, cuffs, and front with large pearls. The coat will be worn at the dinner of the Prince of Wales."

—Mr. A. B. Allen has exhibited at the office of The State Register newspaper at New York, Ill., a medal which will be interesting to collectors. It is of silver, weighs 4 ounces, is 7 1/2 inches in circumference, one-fourth of an inch thick, and value of \$4.50. On one side appears "James Monroe, President of the United States" with a bust of Monroe, and the signature "First U. S." On the obverse is a pine, towhee, clasped hands, and the inscription "Friend and Friend." Mr. Allen has refused \$100 for the medal, which he believed was given to Occalla, the Seminole Chief.

Le Boutillier & Bride,

IMPORTERS,

10 Maiden Lane, N. Y.

NEW IMPORTATIONS OF

FRENCH CLOCKS,

BRONZES, MUSICAL BOXES,

RICH FANCY GOODS.

SPECIAL NOTICE.

We are now prepared to submit to OUT OF TOWN CUSTOMERS Photographs of our Goods, in order to give dealers the advantage of seeing and ordering the latest designs. These Photographs will give the exact measurement and prices.

(C) Applicants unknown to us will please give city references.

FORMERLY

Shepard, Le Boutillier & Co.

CRYSTAL CHANDELIERS

GILT, BRONZE & DECORATED GAS FIXTURES,

Fine Marble & Bronze CLOCKS,

Bronze Figures and Ornaments in Greatest Variety, at Low Prices, Manufactured by

Mitchell, Vance & Co.

No. 597 BROADWAY NEW YORK.

"Medal of Special Award" by American Institute, 1872,

No. 710, GAS FIXTURES.

MITCHELL, VANCE & Co., 597 Broadway, N. Y. We had the above-mentioned Fixtures and Gas Chandeliers, for design, excellence of workmanship and finish in all their parts, to be the best production in the country and we may say, in our judgment, excelled by no other country in the world.

We recommend a MEDAL OF SPECIAL AWARD.

(Signed) JOHN W. CHAMBERS, Secretary.

"Medal of Special Award confirmed."

JUDGE'S REPORT

Forty-fourth National Industrial Exhibition

AMERICAN INSTITUTE, 1875.

GAS FIXTURES.

"The display made by this firm is magnificent. The quality and finish combined, and expenditure any exhibition in this class of goods has ever made of this country."

CENTRE SLIDE CHANDELIERS.

"This Centre Light Slide (Chandelier) is the best in its practical working of any we have seen or know of."

BRONZES.

"The fine finish of these goods is fully equal to imported Bronzes."

CHURCH METAL FURNITURE.

"We deem the articles of church furniture exhibited by the American Institute, New York, N. Y., a great addition to the class of goods in every respect, and deserving of the highest praise for their quality and beauty."

BEST METALS AWARDED.

(Signed) JOHN W. CHAMBERS, Secy.

ARNCHER & PANCOAST MFG. CO.

67 Greene Street, 69, 70, 72 Wooster Street, & Above Broadway



AMERICAN WATCH COMPANY

OF WALTHAM.

NEW LADIES' STEM-WINDING MOVEMENTS.

Named American Watch Co.

RIVERSIDE!



The above Movement is made in 8 size [English], has expansion adjusted balance, hardened and tempered hairspring and exposed pallets, and after one year's trial proves itself a thoroughly good and reliable Stem-Winder and Time-Keeper.

We have constantly on hand a full assortment of Gold Cases for the above movement in 14 & 18 karat, warranted plump quality, and unsurpassed for beauty of finish and style.

Dealers should see these Gold Watches complete before ordering Gold Cases elsewhere.

**The cheapest Lady's Stem Winding Movement ever offered
by any manufacturer, either Swiss or American.**

ROBBINS & APPLETON,

No. 1 Bond Street, New York.

No. 8 Summer Street, Boston.

No. 5 Tribune Building, Chicago.

"Taking Advantage of the Situation."



Size 18x17 inches. Printed in 10 color colors.

Many of the readers of the CIRCULAR will look in this number for a report of the drawing for the diamond carrying. When it was stated in the CIRCULAR that the whole number would be sold easily by the holidays, I thought that what had proved a remarkably good thing for me in my business, if frankly stated to the trade throughout the country, would result in the sale of the 4,000 chromos in a month's time. I have had orders from nearly every State of from one to twenty at a time, but the ones have by far outnumbered the two's and twenty's, and the consequence is the drawing has had to be postponed. I have never failed in carrying out an undertaking yet, and I do not propose being buffeted in this.

It seems to me that there must be among the 9,000 jewelers in this country at least 100 who can use 25 or more of these unique pictures and make it pay them well; and in order to push the matter to a speedy issue I now offer to 100 jewelers twenty-five chromos for \$35, with numbers in the drawing to correspond.

The picture is such a good thing of its kind that it seems to me I ought to receive more than 100 responses within ten days, and I hope this liberal offer will result in the drawing taking place on the 22d of February.

Parties not wishing as many as 25 can have them as before:

1 for	\$2.00
1 with name and address,	2.75
5 " " " "	10.00
12 " " " "	20.00
25 " " " "	35.00

I began to feel the good effects of the chromo last April (four months after its issue), and from that time to June 31

MY BUSINESS INCREASED 38 PER CENT.

OVER 1.5 YEAR, and I give the credit of this remarkable increase in these very dull times to this unique picture; and when we remember that business has everywhere been in the down grade this fact speaks more in favor of the chromos than I could say in a volume.

That I speak the truth in regard to my business will be doubted by no one who knows me, and I stand ready to show my works to any one who has a doubt about it.

TO WHOM IT MAY CONCERN:

We, the undersigned, having known Mr. J. H. JOHNSON for the last fifteen years or more, have no hesitation in saying that we believe that any matter of business undertaken by him will be carried out to the letter, and that any statement made by him may be implicitly relied upon.

WHEELER, PARSONS & HAYES, 2 Maiden Lane.
SMITH & HEDGECOCK, 1 Maiden Lane.
BRANDY, STREETS & CO., 9 Maiden Lane.
DAVID & HEDGECOCK, 9 Maiden Lane.
MERIDEN SILVER PLATE CO., Charles Casper, Pres't.
VINCENZI JEWELRY CO., Jas. V. Schoemaker, 191 Broadway.
WHITING MFG CO., C. E. Bulkley, Pres't, 181 Broadway.
CARPIS, HOWNERS & SLOAN, 1 Bond Street.
GOREHAM MFG CO., 1 Bond Street.

Mr. A. Bonaldi, a very skillful designer of jewelry, at No. 5 Extra Place, New York, is about to publish a monthly sheet of practical designs for jewelers. A subscription has been placed at \$6 per annum. Parties desiring these can address the office of this journal.

Fashion Notes.

The regulation number of bracelets called "porte-bonheur" seems to be sixteen. As these are all worn on one arm, the question arises whether such a wholesale deviation to the cause of a reigning fashion will not end by making women appear like the typical Jewish maiden in Babylonian captivity.

As an appropriate adjunct to this we must mention what are vulgarly called "dog-collars," made of silver, with delicate filigree earrings to match, and with belt or circle of the same. These necklaces certainly are becoming when worn with the plain, high-neck, tight-throated dresses, which need some relief.

The court ladies of Europe, whose attire is closely copied by some ladies in America, wear jeweled bands tightly clasped around the throat. They are of exquisite workmanship, and are encrusted with precious stones. Although they appear to be barbaric and highly uncomfortable, ingenious devices for making them elastic and yielding have been invented all but the outward semblance of discomfort.

Chains of sequins are very much used; they are grouped in rows of five or seven chains, but this makes a very showy display, one or two rows being sufficient. Smaller chains are used for the hair, to be caught among the puffs with large gold or silver combs. A species of "blue jet" has been also made to supersede jet in light morning. This jet, under a bright light, throws off both blue and green tints. The wings and bodies are encrusted with scales are set on wires for the hair; and earrings and necklaces of similar material are equally showy and beautiful.

Very large fans are no longer fashionable; they are still painted in delicate colors, and some of these paintings are exquisitely beautiful, and make the fan a real work of art. Curled marabout feathers edge them, and finisly-wrought chains attach them to the waist.

The taste for small buttons on evening as well as on street dresses has brought up a new and pretty fashion. Fine filigree, delicate pink coral, agate, and other precious materials are pressed into service, and individual taste is exercised in the selection of buttons, which must harmonize with both costume and jewelry.

Locketts containing copies of Grouse on copper, or of Wattson on porcelain, are set in Kirschen, and also in plain gold, with odd designs in red and green. There are costly trinkets of mythological studies, cut upon the pure green of chrysoprase, the pale pink sand and dark onyx. Repousse work is executed by means of blows from a small hammer, struck in the back of the iron plate, after the original method practised by Benvenuto Cellini; the figures are afterward polished and finished on the right side. Cameos are in favor, and consequently, the values of onyx, sardonyx, amethyst and chalcedony are greatly enhanced. A very unique bracelet of tapering shape and knife-edge, in a New York store, is set with three large pearls, black, smitten and white placed diagonally. Opals are again in fashion, and are likely to continue so; for, in addition to the singular beauty of the gem, they are the only precious stones which defy imitation. Pink pearls are greatly esteemed. One of these rare gems, unset and perfectly round, weighs 41 grains; and a set of earrings and pendant—much of royal beauty—has large satin-finish pearls, each weighing 80 grains.

A superb diamond aigrette of three large stars is arranged to be worn also as a pendant and earrings, and to be adjusted on three long golden hair-pins. The stars are closely set with small diamonds, with large center diamond. The slender knife-edge setting tapers gradually away at the back of the aigrette.

Mr. Granbery, late of the firm of Lawson & Granbery, a gentleman well and favorably known on the road, will open an office at No. 24 John street, for the purpose of conducting a jewelry and coral business.

The February number of the CIRCULAR will commence Vol. VII. Don't fail to renew your subscription.

House Established in 1837.

The Oldest in the Trade.

VICTOR BISHOP,

IMPORTER OF
PRECIOUS STONES, CAMEOS,

—AND—

CORAL JEWELRY

No. 47 NASSAU STREET, NEW YORK.

Largest Stock in the country of ALL articles, either real or imitation, suitable to be set in Jewelry; Also, Importer of Enamel for Gold and Plated Jewelry, Gold Shells, Silver and Copper Foil, &c.

SPECIAL ANNOUNCEMENT.

WE beg to advise our friends that having reduced to the lowest figure our prices on our whole stock of CORAL JEWELRY, including the very latest novelties of the Neapolitan market, we are compelled to decline to consign any of these goods this season. We offer to CASH PURCHASERS unprecedented advantages, and earnestly solicit their orders.

VICTOR BISHOP, No. 47 Nassau Street, N. Y.

DENNISON & CO.

MANUFACTURERS OF

Jewelers' Findings

Consisting of PAPER BOXES of Every Description,

JEWELERS' CARDS, MECHANICAL TAGS, CHAMOIS SKINS, TISSUE PAPERS, PINK & WHITE CORROS, (Sheets & Bats), TWINES, &c.

202 BROADWAY, NEW YORK.

5 Suffolk Place, Boston, Mass.

632 Chestnut St. Philadelphia.

150 South Clark St. Chicago.

169 Vine Street, Cincinnati.

110 Fine Street, St. Louis.



J. F. FRADLEY,

MANUFACTURER OF

Fine Gold and Silver-Headed

Walking Canes,

—AND—

STERLING SILVER-WARE,

OFFICE AND FACTORY,

No. 18 JOHN STREET,

NEW YORK.

CASH CAPITAL, - - - - -	\$400,000.00
SURPLUS, as regards Policy Holders, -	\$1,333,172.18
GROSS ASSETS. Jan. 1, 1875, - - -	\$1,426,954.82

I. REMSEN LANE, Secretary. B. S. WALCOTT, President.

regard to quality of workmanship is very likely to become more ambitious in improving himself. All his aim and ambition is to become master of a certain branch of the trade, and if he succeeds, after a few years of apprenticeship, to offer himself to the highest bidder (papers of indentures being now quite out of fashion), and if not to change his trade for something else that promises better returns. Owing to this, the general result is that the standard of workmanship is lowered, prices cut down, and animosities created between employers and employees and I may say also jealousies between good and bad workmen.

Another result is also that employers knowing that they may lose their apprentices at any time do not trouble themselves in teaching them thoroughly, and merely try to make the most of them for the time being.

I would also add a few words of advice to the skilled workman, although your correspondent has already given you a hint. It is this: Let not the skilled workman be afraid to impart his knowledge to others. I don't care how many. It is short-sightedness which counsels him to withhold from one that which he himself has learned from another. It is selfish and suicidal, for it is only because there are too many incapable workmen that prices are cut down. The more a man knows the more he is likely to demand fair price for his work. It is only those who know little who hurt the trade; they, in poor times, are compelled to work at reduced wages, and accept them because the range of their abilities is limited. Therefore, I would say again, help one another, show one another that which you know best; never refuse advice to an apprentice who properly asks, or die you cut your own throat. It is a matter of property to more than you think.

My letter being rather long, I think it is time to stop, but I may in future, if you permit me, Mr. Editor, have some thing more to say on the subject. Yours, respectfully, P. J.

Official List of Patents

PREPARED EXPRESSLY FOR THE JEWELER'S CIRCULAR.

Issued by the U. S. Patent Office for the month ending Jan. 4th, that relate to the arts and manufactures represented by the JEWELER'S CIRCULAR.

170,212—Geographical Clocks.—Samuel J. Wallace, Keokuk, Iowa.

BRIEF.—A multiple-pointed pointer index for time-indicators, having one of the points moving together made separate, so that it may be changed and set to show any local time without interfering with the regular indications of the remainder of the points.

170,244—Watch-case Springs.—Ansel S. Buckle, Colera, Cal.

BRIEF.—An improved spring for watch-cases, consisting of a longitudinally-adjustable plate and diminutive vertical supports, said supports being located, respectively, near the middle and near the rear end of the plate.

170,423—Solar Chronometers.—Marshall Wheeler, Big Rapids, Mich.

170,474—Watchcase Time Detectors.—Wm. Imhäuser, Brooklyn, N. Y.

BRIEF.—To guard against dishonest watchmen, who open the case and mark the dial without going their rounds. Provides the time detector with an additional marker, which marks the dial whenever the case is opened.

170,553—Time Clocks.—Lewis A. Haines, Westminster, Md.

BRIEF.—Two graduated dials, actuated by time mechanism, and having notches in their peripheries, which, will, at the proper time, release a weighted arm and allow the bolts to be unlocked by the turning of the cam plate. An auxiliary graduated dial, having a groove and notch in its face, combined with a gravitating arm having a pin on one end, adapted to enter a groove in said dial, and, by its extension on its pivoted end, which, with a stud on a spring cam-plate, will hold the bolts unlocked, and at the expiration of a given time will release the said stud and allow the bolts to be locked by the recoil of the cam-plate.

170,558—Time Locks.—Patrick B. Hennessey, Hamilton, Canada.

BRIEF.—The bolt is automatically locked by means of spring lever and pawl, and is unlocked by means of a time-measuring action on the said spring lever, so as to cause the latter to release the pawl from the bolt, when it will drop by its own gravity, and remain unlocked until the time-measuring is again set.

170,591—Metal-Drilling Machines.—S. W. Putnam, Fitchburg, Mass.

BRIEF.—The bearings for the palley-shaft are split, and are adjusted to take up wear by screws. A flexible wedge is placed between the split portion of each bearing, and said wedge being an absorbent, it will act, when compressed, as an automatic lubricator to the shaft. Adjustable gibs are provided to take up wear between the post and the bearing to the work-holding table.

170,625—Apparatus for Roasting Gold and Silver Ores. Robert M. Fryer, New York, N. Y.

170,768—Screw-Cutting Die.—V. J. Reece, Greenfield, Mass.

BRIEF.—A die made with split spring ends, set by spreading-pin and adjustable screw passing at right-angles to its length, one of the split ends of the die, substantially as and for the purpose set forth.

170,826—Spinning Ring Holders.—Geo. Draper, Hopedale, Mass.

BRIEF.—A tapering ring holder of sheet metal, provided with flange and ring-holding projections, to be combined with a ring-rod and adjusting screws, to bring and hold the ring into concentricity with the spindle-rod.

170,935—Water-Cut-ting Fluids.—A. Monnier, Sacramento, Cal.

BRIEF.—A compound for cleansing watches, jewelry, and other articles, consisting of distilled water, pure caustic soap, and cyanide of potassium.

171,095—Electric Clocks.—Elijah Clark, Paris, Ky.

Strasburger's Failure.

The extraordinary failure of Moses Strasburger, importer and dealer in watches, at No. 3 Maiden Lane, N. Y., and his branch houses of Strasburger & Co., of St. Louis, is one of the chief topics of Trade Interest. The New York Herald comments as follows:

This failure causes much surprise among creditors, both houses having liabilities of over \$300,000 and showing little assets. The St. Louis concern only commenced business last August with a capital of \$25,000, \$25,000 of which was contributed by the concern by Mr. Strasburger and \$10,000 by his partner and leather haw, S. Rosenblatt. The latter managed the St. Louis house, and purchased over \$100,000 worth of goods from several Maiden Lane and branch houses in New York and Providence. Soon after their failure in December, a meeting of the creditors was called at the rooms of the Jewellers Association, No. 1 Bond Street, to take such action as the extraordinary circumstances then and there of the large creditors were the present, and after a few discussions, the feeling seemed to be unanimous that the failure of such a concern as that of Mr. Strasburger & Co., of St. Louis, with a capital of \$35,000 and over \$100,000 in goods, before they put the line blot, was not only a disgraceful failure but an outrageous swindle. So, on motion of Mr. John Fox, a committee of ten was appointed by the meeting with power to assess all the creditors to provide for expenses, and to employ counsel and post for a thorough investigation and to proceed against the firm criminally and otherwise. The committee consisted of John Foley, Daniel F. Appleton, W. D. Miller, F. E. Morse, and Henry Binkley. This committee took prompt action. Mr. Morse was sent out by St. Louis at once, and he caused the arrest of Rosenblatt and put the concern there into bankruptcy. Strasburger barely called a meeting of his creditors at the office of his lawyers, Messrs. Townsend & Walbecker, No. 343 Broadway. Over 100 creditors were present. In fact it was perhaps the largest meeting of the jewelry trade ever seen in New York, nearly all the Maiden Lane houses being represented. Mr. Strasburger was present, and finally failed to give any satisfactory explanation of his liabilities of upward of \$300,000. On inquiring how the St. Louis concern was supported he had paid only one bill of \$110. At the close of the meeting, and by instructions of the committee of five, Mr. Strasburger was arrested by a United States deputy marshal under a warrant granted in the morning by Judge Blackford. The feeling against Strasburger is bitter and intense.

Since the above was in type we learn that Strasburger has been arrested a second time.

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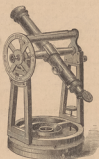
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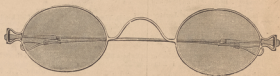
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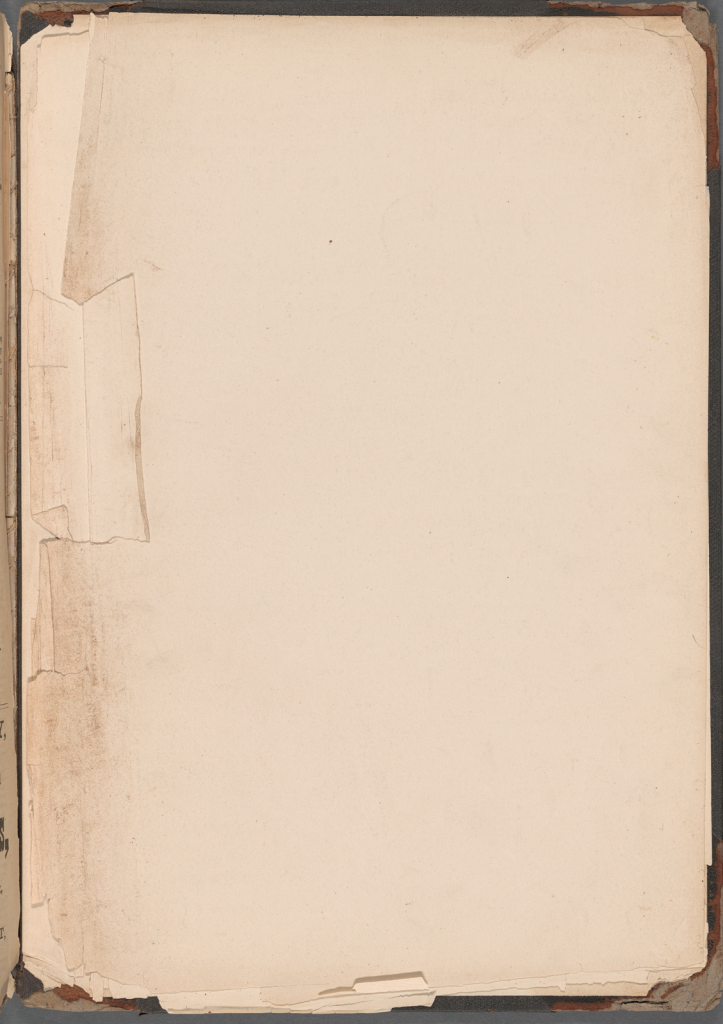
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